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ANNALS OF MEDICINE

VOLUME I APRIL, 1920 NUMBER 1

THE FIELD OF INTERNAL MEDICINE

BY REYNOLD WEBB WILCOX, M.A., M.D., LL.D., D.C.L., F.A.C.P.

President of the American College of Physicians; Formerly President of the American Congress on Internal Medicine; Formerly Professor of Medicine, Post Graduate School and Hospital

NEW YORK

THE organization of the American Congress on Internal Medicine does not signify the differentiation of a new specialty, but the delimitation of the oldest branch of the healing art, for it is probable that disease received earlier attention than injury. Whatever may be the fact, it is, however, true that medicine and surgery were yet undifferentiated in practice throughout the era of the prehistoric man, and even for many centuries thereafter. As war became more and more an organized operation and campaigns were planned, the care of the wounded devolved upon the practitioner of the healing art, and surgery became differentiated in name as well as practice, and the chief surgeon of the army was often the physician of the ruling prince or king. Nor, indeed, did his professional title always change, for even so late as the War of the Revolution in this country the title of the medical officer was physician and not surgeon. Yet today in the army the title of surgeon prevails, while the more important work of the military practitioner, whether considered from the combatant or the altruistic standpoint, is medical rather than surgical.

What then is the domain of internal medicine? Shall we define it as what remains after surgery and the narrower specialties, as ophthalmology, otology, laryngology, gynecology, andrology and urology, or whatever of it belongs to the preceding two categories, are subtracted? Or shall we still further diminish its field by eliminating neurology, psychiatry, pediatrics and dermatology? The position of the dermatologist calls for especial consideration. It is conceded that surgery does not claim him. If we follow the Vienna school in assuming that the skin is an organ, as the eye or the ear, he would be an exponent of one of the narrower fields of specialism. If we should adhere to the tenets of the London school and expect the attention to be directed to the study of systemic conditions, which that school has emphasized, he could readily be enrolled as a practitioner of internal medicine. In fact, one of the greatest names of that department of the healing art was Hutchinson, whose fame rests largely upon a disease, syphilis, which is clearly in the field of internal medicine. If we are influenced by the Paris school, our decision must rest somewhat in doubt. However, this is a question upon which the Congress eventually must take official action. A definition which is predicated solely upon exclusion is neither logical nor final. The schismatic operations being repeated, the remaining moiety might readily become negligible. A definition must be not only inclusive, but exclusive as well.

We may define the domain of internal medicine as including:

1. Diseases caused by parasites: Psorospermiasis, distomiasis, trypanosomiasis and by nematodes, cestodes and parasitic insects from arachnidæ to pediculi, either as directly causing disease or by their acting as carriers.

2. Infectious diseases, of which enteric fever, diphtheria, infectious pneumonia, tuberculosis, erysipelas, syphilis and the eruptive fevers, communicable or contagious, represent various types. These number nearly ninety, the majority of definite and known causation, all readily recognizable, and all presenting pathological manifestations of which the treatment must fall to the lot of the internist.

3. Constitutional diseases, such as gout, diabetes, scurvy, rickets and others.

4. Intoxications, including the various metallic poisonings, alcoholism and other drug poisonings, food and occupational poisonings, and the results of exposure to high temperatures.

5. Diseases of the digestive system and its adnexa, the liver, and pancreas.

6. Diseases of the blood and of the ductless glands, which are not only of increasing interest and importance, but are likely, in the future, to necessitate a new classification.

7. Diseases of the circulatory system; heart, pericardium and blood vessels.

8. Diseases of the respiratory system, including those of the pleura.

9. Diseases of the mediastinum, few in number, and relatively rare, but of great difficulty in diagnosis.

10. Disease of the urinary system.

11. Diseases of the nervous system, including those of the mind.

12. Disease of the muscular system; the myosites, the dystrophies and the disorders of function of which myasthenia, myotonia and paramyoclonus are types.

It cannot be assumed that this classification is final, because not only are individual diseases constantly changing from one division to another, as, for instance, pneumonia from diseases of the respiratory system to the infectious diseases, but also some groups may be merged together as our knowledge of etiology increases. The terrain will remain the same, although the boundaries of the different divisions may change.

This, then, is the broad domain of internal medicine, which is of such eminent importance in the life-history of mankind, and which dominates all the limited specialties of the healing art. Its successful cultivation demands that all sciences render aid—physics, and its younger brother, physical chemistry, botany, zoology and especially biology in the broader acceptation. Upon this advanced knowledge and the logical interpretations of it, and the legitimate applications to that complex category of physico-chemical relationships, which we call life, must depend substantial and beneficial progress in internal medicine. In its domain are to be found the greatest incidence of disease, either in number or importance of disability and the preponderating causes of death.

Can this field of internal medicine be divided? There is no doubt that in practice this may be done to a limited extent. For instance, diseases of the nervous system can be separated from internal medicine and the neurologist may confine his efforts to diseases of that system, and further the psychiatrist may limit his practice to the diseases of the mind, but he will be the more useful alienist whose knowledge of diseases of the nervous system is the greater, and both will be more completely experts the more accurate and comprehensive their knowledge of the broad field of internal medicine has become. The medical diseases of infancy and childhood have many exponents who properly confine their practice to those periods, because not only does the physiology and pathology of the constructive period of the body differ from that of the adult, but diagnosis and treatment present variant problems. So also do the diseases incident to old age, but with a solution hopeless as to the final outcome, though fruitful in alleviating many of its discomforts. In passing, attention might be called to the fact that the

time during which the pediatrist exercises his functions does not always end with puberty, but may even extend itself through that of childhood, which some of our pedagogues, notably college presidents, assume to continue during the entire period of education which is necessary to adopt the human being to his environment and to fit him for his greatest usefulness, and this period has been mentioned as thirty years. When we reflect that the storm and stress of modern civilization have shortened the span of human life, and men may be octogenarians in body, if not mind, at sixty or even earlier, the period of adult life may become a brief one, and the pediatrist and the geriatrist may almost meet in their separate fields of activity. Thus it is evident that both should be thoroughly versed in the domain of internal medicine. It is indeed true that the foundation of senility is laid in the period of childhood, and that man usually begins to die the moment that he is born. The laboratory workers, whether in the field of biological chemistry, bacteriology, parasitology, physiological therapeutics and in physics, especially in electrotherapeutics and roentgenology certainly have claim upon our consideration. To them internal medicine owes much, not only in indicating new avenues of progress, but as well in scientific demonstration of the verity of what empirically we have established as facts in internal medicine—and we have made but a beginning.

Granting that the foregoing are legitimate subdivisions of scientific endeavor and practical realization in the field of internal medicine, the question of further limitation of practice immediately suggests itself. The natural cleavage would be in accordance with the classification which has been given at the outset, according to the different physiological systems. The diseases of the circulatory system depend upon a distinct group of organs, but the results of imperfect function or structural disease are as far reaching as the circulation of the blood, and their symptomatology may be the symptoms ascribable to any one, several, or all of the physiological systems. The worker in the field of diseases of the circulatory system may limit his practice, but he will be expert only as he is versed in internal medicine. The "stomach specialist" *per se* has no reason for his existence. If he devotes himself to diseases of the digestive system and includes with these the disorders of metabolism and the constitutional diseases his field is broad enough to occupy his best endeavors, but here again he must be conversant with the established facts of the larger territory occupied by internal medicine if he shall attain real usefulness.

So might be cited the group of infectious diseases, often presenting problems of diagnosis, and the same statement applies as to the importance of a broad and comprehensive knowledge of internal medicine. Further than this, the exponent of internal medicine, no matter whether he shall be the one considering the field in its entirety, or one limiting his work to a subdivision of it, must know syphilis in all its manifestations, and its results. For its widely spread incidence must always be taken into account as modifying disease or dominating therapy throughout the whole field of internal medicine. Its signs and symptoms are often so bizarre that even its recognition, at times, is exceedingly difficult, the Wassermann reaction notwithstanding. The range and scope of internal medicine are well defined and its domain is accurately marked out, both inclusively and exclusively.

The relationship of surgery to internal medicine is intimate, and yet the differentiation is apparent. There is hardly a disease in the entire range of internal medicine but that at some time in its course, or in the presence of some complication, surgical intervention may be called for. And this intervention may be necessary at an early date—in fact, so soon as the diagnosis can be established, as, for instance, in acute appendicitis. It is well to bear in mind that what are often denominated border-line diseases are really those in which the activities of the medical attention and surgical practice are concurrent. There are others, for example, cholelithiasis, in which the etiology falls in the do-

main of internal medicine, the important item of relief comes under the jurisdiction of the surgeon, while the final cure comes within the purview of internal medicine.

As internal medicine and its contributing laboratory work has laid the foundations for real surgical advance, so internal medicine can make surgery of its highest possible value. The best surgical work done in this country to-day is accomplished by intimate scientific cooperation between the skilled exponents of internal medicine and the expert operator. The mere operator may be an agent of destruction, no matter how deft he may be or how perfect his technic. He only reaches his highest usefulness when he has a broad knowledge of internal medicine; that is, becomes a surgeon, or relies upon other experts for diagnosis and an analysis of the real condition of the organs and functions of the patient. Naturally, this statement does not apply in its entirety to operations of urgency. When the surgeon attempts to be a general practitioner we are likely to be informed as to the surgery of dyspepsia or the ablation of a function. Medical surgery is not likely to yield the best results and surgical medicine is sure to be disappointing.

The relationship of internal medicine to surgery is fundamental and necessary—this fact must be recognized by the practitioners of both—but it must be founded on mutual confidence and respect for technical skill. Although internal medicine dominates the situation, it does not detract from a just admiration for the wonderful results which modern surgery has accomplished. The mechanical skill and the perfect technic of the operator are rewarded by appreciation, but the intellectual work of the trained exponent of internal medicine is equally worthy of admiration.

We have defined the field of internal medicine and have shown its relationship to the coordinate branch of the healing art—surgery—and the narrow specialties, and now we must define our name.

It is a curious fact that the practitioners of internal medicine have not yet, by common consent, so far as this country is concerned, received a distinctive name. The term "diagnostician" has been suggested. Diagnosticians we certainly are, and we are proud to be considered as such, but we realize, better probably than any other group of practitioners, that diagnosis is not the sum total of our efforts, but only the conclusion of the first stage of our work, and merely preliminary to the part that is most important to our patients, which is treatment. We certainly are not general practitioners, either in theory or practice. For, with the mass of accumulated facts and the logical deductions therefrom, neither the learning of an Aristotle nor the intellect of a Bacon, nor both combined, if such a genius were possible, could result in so broad a knowledge, so vast an experience, and so great a techincal skill that all phases of scientific endeavor could be marked with such a degree of usefulness as we believe adequate for professional work. Nor does this statement conflict with the opinion that specialists, both broad and narrow, are better specialists if the earlier years of their career are devoted to general practice, and the broader their knowledge and the larger their experience in the general field the more likely are they to become really expert in the smaller field to which their natural aptitude or especial opportunities may have limited them. The name "internist" is undoubtedly the proper one for those whose activities are circumscribed by the limits which have been set down earlier in this address. The term "physician" too often is assumed to have the qualifying adjective "general" omitted, and is not distinctive. In the profession even, one who has worked exclusively in the field of internal medicine for a quarter of a century, eschewing surgery, obstetrics and the narrower specialties, who has been a teacher of medicine and an author of text-books upon its practice, is frequently and erroneously designated as a "general practitioner." In Great Britain we are known as "internists"; on the Continent "internal medicine" is recognized. Let us be known in this country as " internists", and be willing to define the

term until such time as the profession and the people know what it means, and medical associations, big and little, representing or not medical science, afford the designation official recognition.

We must teach that the "internist" is an educated and trained physician, who gives his best endeavors to an accurately delimited field, known as "internal medicine," and that the real internist is not only a specialist, but, what is far more rare, an expert. It is to the internist that the heritage of the earlier physicians has come. This is the American Congress on Internal Medicine, and we are the descendants of men who have served their time and generation, and have left their impress upon American medicine.

We probably recall John Morgan (b. 1736), of Philadelphia, pioneer with William Shippen, Jr. (b. 1736), in the establishment of a school for medical education, the grandfather of American medicine, and Samuel Bard (b. 1742), of New York, who was identified with the earliest medical instruction in this city. Probably the best known name of this generation, but whose activities were so varied that he is better known in connection with the revolutionary period, was the Father of American Medicine, Benjamin Rush (b. 1745), of Philadelphia; his third edition of "Medical Inquiries and Observations Upon the Diseases of the Mind" (his first was in 1812) lies before the writer bearing the date 1827. It is interesting, if not instructive, and written in idiomatic and classical English well worthy of Addison, it is a model for the medical editor of today.

Another worthy of this period was Nathan Smith (b. 1762), who at Dartmouth did not occupy a professional chair, but rather an entire settee, for he taught medicine, surgery, anatomy, therapeutics, botany, physiology and chemistry. A contemporary of Daniel Webster, although there was twenty years difference in their ages, he contributed much to medical science, as well as establishing two medical schools. In 1813 he came to New Haven and repeated his pioneer work in founding the medical school which subsequently became a part of Yale. He died in 1829, and his grave in the Grove Street cemetery is still a Mecca for medical men. As professor of the theory and practice of physic and surgery, his name is upon the diploma given to the writer's grandfather, in 1819.

The fourth to establish medical schools was Benjamin Waterhouse, the physician, who with John Warren (b. 1753), made possible a medical school in connection with Harvard, in 1782. He also was the first to introduce Jennerian vaccination into this country, which he did in 1800. In all the early efforts to establish medical instruction in this country, the medical aspect of the healing art looms large.

The son of Nathan Smith, Nathan R. Smith, in 1825 published his "Physiological Essay on Digestion," which antedated much that was subsequently discovered. The writer's copy from his grandfather's library, bears upon its title page this sentence: "It is no small part of science to be well acquainted with its real boundaries; but it is necessary also to know what it is which truly exists within these boundaries, and what it is which is only fabled to exist." A little later than this time we recall William Beaumont (b. 1784), pioneer physiologist of this country, whose experiments and observations on the "Gastric Juice and Physiology of Digestion," Plattsburg, 1833, were epoch making. Curiously enough, the place of his observations upon Alexis St. Martin was the battlefield of 1814, a portion of which is now occupied by the Military Training Camp, with which you are all familiar.

Passing by many contemporary lesser lights, we come to another epoch-making medical advance. While we may speak of the work of Crawford W. Long and his rival claimants to priority, Jackson, Wells and Marcy, this fact is firmly established: It was William T. G. Morton (b. 1819) who first publicly demonstrated that by the inhalation of ether unconsciousness sufficiently profound to permit of surgical interference could be produced by medical means. This was on October 16, 1846; the place was the Massachusetts General Hospital, and there

are many persons still living who have heard the narration of that event from the lips of those present at the demonstration. It was also another graduate of Harvard, Oliver Wendell Holmes, in his early days a physician, but better known as an author of delightful fiction, both prose and poetry, and a teacher of anatomy, who coined the word "anesthesia," by which this priceless boon to humanity is known throughout the whole world.

Medicine has made modern surgery possible, and to it credit must be given for the wonderful surgical work that is being done today. Parenthetically it might be remarked that anesthesia has also permitted some very mediocre surgery—thus not every great blessing is entirely unalloyed.

Fundamental, also, to the present value of surgery is antisepsis, which has been developed as purely a medical problem, and which has led to asepsis as an ideal of more or less complete realization, although the recent European conflict has demonstrated that chemical antisepsis is still of great importance.

Of the more recent developments in medical science due to American medicine we need only allude to our antityphoid vaccine, the most efficient of any country, to our work on uncinariasis, yellow-fever, pellagra and malaria and to our work on sanitation in tropical and subtropical countries, which has given such brilliant results. Among the names of those who have made medical history some are yet living—others, alas, have fallen, martyrs to medical science.

The greatest triumphs over diseases, and even death, achieved during the last half century have been medical rather than surgical. They have been the discovery of the *causa causans* of disease, and the separation of the infections, due to bacteria, or protozoa or other organisms of the lower zoological orders, from the inflammations and degenerations. The direct result of our knowledge of etiology has resulted in the preventing of the incidence of disease on the one hand, by intelligent hygiene, and by extensions of the theory of Jennerian vaccination to other diseases, notably diphtheria, tetanus and enteric fever. And a further direct result has been the ability to cure such infections during brief periods, as has been particularly demonstrated in diphtheria, malaria and syphilis, and not only this, but as well, by serological methods, to demonstrate that the cure is absolute and permanent. In others, as acute rheumatic polyarthritis, we have found methods to markedly shorten its duration, directly alleviate suffering, and prevent frequent complications.

Among the constitutional diseases absolute prevention and relative cure have been brought about in certain conditions—in scorbutus, diabetes and gout—with a minimizing of suffering in some and averting a fatal issue in others. In diseases of the circulatory system medicine has made startling advances in drug therapy and physical procedures, so that no longer are the problems approached with other than confident expectation of benefit and relative cure so long as degenerations can be checked in their course and structural changes have not extended beyond the possibility of functional recovery. The same may be said of the diseases of the respiratory, digestive and urinary systems. Among the great triumphs of recent medicine may be cited the accurate and productive studies upon the blood, and work upon the functions of the ductless glands, the results of which have been far reaching and of inestimable value, and whose importance in health and disease cannot be overestimated. It seems evident that these problems are purely the problems of internal medicine, and their solution depends solely upon the internist. In fine, the most important developments in the healing art, important not only in the largest number of diseases and of major importance, but as well in the larger number of individuals afflicted, has been in the domain of internal medicine. And, furthermore, the greatest progress in the immediate future must of necessity be in this very field.

The record of the distinguished physicians, our medical ancestors, is far too long to be adequately presented in a ponderous tome,

let alone in an address. They were giants in those days, of thorough mental training and discipline, of accurate and painstaking observation, of rigid logical analysis and productive clinical deductions. They have contributed in large measure to the advance of medical science and therapeutic art. We are the legatees of these physicians of a magnificent medical past, and as internists we are the trustees of the glorious internal medicine of the future, whose soundness in scientific basis, whose development in the alleviation of suffering and the prevention and cure of disease, and whose value to suffering humanity only the seer may venture to predict. This is the function of the Congress on Internal Medicine: to view with reverence the foundations laid down, broad and deep by the physicians, our medical ancestors, and as internists to raise upon them a useful structure for the healing of the nations.

The Congress on Internal Medicine has, then, for its *raison d'etre*: (1) to define its domain, (2) to procure recognition of the designation "internists," (3) to promote solidarity of the interest and achievement among them and (4), finally and most important, to advance the science of biological medicine, of which we are the exponents; (*a*) by the selection of experts who shall report the results of their investigations of important problems and of intensive clinical study and experience, (*b*) by extending the sphere of influence of the constructive workers in internal medicine through publication of their conclusions, (*c*) by authoritatively instructing the public in regard to the great problems of health through the official departments and services now organized, and thus render these more efficient.

We believe that the time has come when the internists should be united for scientific advancement, and for the benefit of suffering humanity, and that this organization shall be controlled by those who have been instrumental in developing internal medicine by modern scientific methods, and that this does not meet a temporary need alone, but its existence and importance will reach far into the future. Of its permanent success the writer has not the slightest misgivings.

The American College of Physicians, through its council, admits to its fellowship by election, those recommended by the council of the American Congress on Internal Medicine from among its members. The membership in the college is restricted to those whose practice is generally in the field of internal medicine or especially in the recognized departments of the same. Its obligations are those of a gentleman and a member of a learned profession. It has been said that the American College of Physicians creates an aristocracy among the internists. The observer has discerned the purpose of the founders of the congress and of the college. He forgets that the graduate who has earned the bachelor of arts degree has become a member of the aristocracy of letters created centuries ago. He also forgets that the master of arts degree, won after study and examinations, admits the bachelor of arts to a smaller group in that aristocracy of letters. These are honors which mark attainment of the individual in his progress toward appreciation of the higher relationships of life.

The degree which represented the completion of medical instruction and the satisfying of tests of knowledge in the earliest days of our medical schools was that of bachelor of medicine, as it is today in some other countries. There is *a priori,* no reason why a bachelor's degree should not mark fittingly the termination of undergraduate study in medicine, as it does even now in the other learned professions of law and theology. However, in 1771, six years after its foundation, the University of Pennsylvania returned for the degree of doctor of medicine four men who had been graduated as bachelors of medicine in 1768. Reference to the catalogue of graduates of Harvard University shows that the bachelor's degree only was granted from 1788 until 1810, inclusive. With the granting of the doctorate of medicine, which now became the general practice, a higher degree in medicine became no longer possible. The degree of doctor of science has been bestowed, in recent years, upon

doctors of medicine who have achieved eminence, although the degree itself is not distinctive. However, medicine is a branch of physical science, and something more, even if Bacon characterized it as the conjectural. But Bacon died in 1626, so, presumably, he should be pardoned for his unfortunate designation. So it has come about that distinction has been sought in degrees properly pertaining to the other learned professions, notably the degrees of doctor of laws and doctor of civil law, although so far as the writer knows the degree of doctor of divinity or doctor of sacred theology has not been granted for distinction in medicine *per se*. Fellowship in the American College of Physicians has been safeguarded, so far as human foresight can go, and it is intended to be reserved for doctors of medicine who have achieved eminence in the field of internal medicine as practitioners and consultants, as investigators and scientists, and as authors and teachers. It is intended that fellowship in the American College of Physicians shall mean that its possessor has attained eminence in, and is an authority upon, internal medicine as a whole, or upon some of its recognized subdivisions. To define our meaning: "No one has reached a position of conceded eminence in his profession unless it is made to appear that he is deeply and broadly educated, that he has made some substantial contribution to the literature of the medical profession, and that he has been entirely related to some phase of medical practice for a sufficient time to cause him to be widely recognized by intelligent members of the medical profession, as well as by a considerable number of people who have occasion to be interested in the services which that profession renders the people." The phase which concerns the college is internal medicine. "Authority in the medical profession is not acquired through a medical education that is only ordinary and a practice that is merely usual; eminence in the profession can be acquired only through the assiduous prosecution of medical practice for a considerable time, and through some special work, that has laid the profession under some obligation to the practitioner." Eminence and authority, as used in this connection, must be given a substantial and significant meaning.

The schools of medicine by their own action created an aristocracy in medicine as distinguished from law and theology; it has now become necessary for the internists to select from among their own number those whom they deem deserving of additional recognition. If this, with less reason, has been found necessary for the surgeons, of by no means distinguished scientific heredity, how much the more imperative is it for the internists that we shall recognize in a substantial manner those who have accomplished much in the upbuilding and the imparting of knowledge in the field of internal medicine?



Reynold Webb Wilcox

President of The American College of Physicians



Elias H. Bartley

Vice President of The American College of Physicians



Glentworth R. Butler

President of The American Congress on Internal Medicine



Frederick Tice

Vice President of The American Congress on Internal Medicine



Augustus Caillè

Treasurer of The American College of Physicians and The American Congress on Internal Medicine.



Clement R. Jones

Second Vice President of The American Congress on Internal Medicine.



Joseph H. Byrne

Associate Secretary-General of The American College of Physicians and The American Congress on Internal Medicine.



Frank Smithies

Secretary-General of The American College of Physicians and The American Congress on Internal Medicine.



Charles D. Aaron



W. H. Mercur



William Gerry Morgan



Charles C. E. de M. Sajous

COUNCILORS OF THE AMERICAN COLLEGE OF PHYSICIANS AND THE AMERICAN CONGRESS ON INTERNAL MEDICINE



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John C. DaCosta



Le Grand Kerr



S. G. Bonney

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Douglas Vander Hoof



Henry E. Tuley



William H. Stewart

COUNCILORS OF THE AMERICAN COLLEGE OF PHYSICIANS AND THE AMERICAN CONGRESS ON INTERNAL MEDICINE



Warren B. Stone



H. P. Barnes

COUNCILORS OF THE AMERICAN COLLEGE OF PHYSICIANS AND THE AMERICAN CONGRESS ON INTERNAL MEDICINE


Convocation
Ceremony
AMERICAN COLLEGE
of PHYSICIANS
Gold Room
Congress Hotel
February 26, 1920.
BURNE & FRIEDMAN
CHICAGO.


Fourth Annual Banquet
American Congress
on Internal Medicine
Thursday, February Twenty-sixth
Nineteen-Twenty
CONGRESS HOTEL
Gold Room
BURKE BY STRICKLAND
CHICAGO.

ROSTER OF MEMBERS OF THE AMERICAN COLLEGE OF PHYSICIANS TO MARCH 1, 1920

ALABAMA

Mobile
Roe, Lee Wright

ARIZONA

Globe
Kirmse, Alvin

ARKANSAS

Hot Springs
Eckel, Geo. Michell
Deadrick, Wm. R.
Thompson, Lloyd

CALIFORNIA

Los Angeles
Brooks, Herbert T.
Browning, Charles G.
Byrnes, Ralph
Campbell, Ralph
Cummings, Rolland
Crispin, Egerton L.
Frick, Donald J.
Granger, A. S.
Hunter, George Graham
King, Jos. M.
Lissner, Henry H.
Moore, Ross
Newton, E. Avery
Orbison, Thomas J.
Scott, A. J., Jr.
Soiland, Albert
Wessels, Walter F.

Monrovia
Pottenger, F. M.

Oakland
Strietman, Wm. H.

Pasadena
Condit, Joseph
Stone, Willard J.

Sacramento
Gundrum, F. F.

San Diego
Pickard, Rawson J.
Pollock, Robert

CALIFORNIA—*Continued*

San Francisco
Voorsanger, Wm. C.

COLORADO

Boulder
Gilbert, Oscar Monroe

Denver
Arndt, Rudolph H.
Arneill, James Rae
Bonney, Sherman G.
Burnett, C. T.
Hall, Josiah N.
Love, Tracy
Neuhaus, G. G.

DISTRICT OF COLUMBIA

Washington
Barnes, Noble P.
Morgan, William Gerry
Mallory, William J.
Roy, Phillip S.
Verbrycke, J. R.

FLORIDA

Jacksonville
Dollear, A. H.
Love, James

GEORGIA

Atlanta
Bunce, Allen H.

Augusta
Mulhearin, W. A.
Murphy, Eugene

ILLINOIS

Chicago
Babcock, Robert H.
Black, Robert A.
Fantus, Bernard
Fischer, S. M.
Frick, Anders
Goldsmith, A. A.
Gray, Ethan Allen
Grubbe, Emil H.

CHICAGO—*Continued*

Heintz, Ed. L.
Hoyne, Archibarld L.
Krafft, Jacob C.
Kaufmann, Gustav L.
Karshner, Clyde F.
Leonard, Edward F.
Lewison, Maurice
Metcalf, Walter
Moyer, Harold
Norden, Henry A.
Orndoff, Benjamin
Patton, Joseph M.
Pietrowicz, Stephen R.
Portis, Milton M.
Quinn, Wm.
Salzman, Samuel
Sempill, Robert A.
Seufert, E. G.
Sheets, Vaughn L.
Smithies, Frank
Stearns, Wm. N.
Tice, Frederick
Trostler, I. S.

Decatur

Brown, Everett
Jack, Cecil M.

Elgin

Gabby, Samuel Lee
Hinton, Ralph

Joliet

Werner, Frederick Wm.

Moline

Beam, Hugh A.

Peoria

Parker, George

Rockford

Weld, Anna

Springfield

Norbury, Frank Parsons

INDIANA

Fort Wayne

McCaskey, George W.

Indianapolis

Kiser, Edward F.
Schweitzer, Ada E.
Wynn, Frank B.

IOWA

Keokuk

Fuller, Frank M.

IOWA—*Continued*

Des Moines

Ryan, Granville
Throckmorton, Tom Bently

Fairfield

Gaumer, Stewart

Sioux City

Meis, Edw. Wm.
Shuman, John W.

KENTUCKY

Louisville

Barbour, Philip F.
Bayless, B. W.
Dowden, C. W.
Fleischaker, Frank W.
Jenkins, William A.
Kirk, J. Allen
Lucas, Charles G.
Meyers, Sidney
Moren, John J.
Morrison, J. A.
Thompson, Cuthbert B.
Tuley, Henry Enos
Young, W. J.

Lexington

Bradley, Ernest B.
Scott, John W.

Newport

Anderson, W. W.

LOUISIANA

New Orleans

Bass, C. C.
De Buys, L. R.
Lemann, Isaac Ivan
Lyons, Randolph

MAINE

Portland

Gehring, E. W.

MARYLAND

Annapolis

Bloedorn, W. A.

Baltimore

Beck, Harvey
Hemmeter, John C.
Leitz, Frederick
Miller, Sydney R.
Shearer, Thomas L.
Simon, Chas. E.
Zueblin, Ernest

MASSACHUSETTS

Boston

Austin, A. E.
Brown, Percy
Dana, Harold W.
McCrudden, Francis H.
Otis, Edward O.
Overlander, C. S.

Worcester

Bigelow, Edward B.

MICHIGAN

Ann Arbor

Klingman, Theophil
Marshall, Mark
Parnall, S. G.

Battle Creek

Mortensen, M. A.
Pritchard, S. J.
Stewart, Charles D.

Detroit

Aaron, Charles D.
Biddle, Arthur Porter
Breisacher, Leo
Cleland, James, Jr.
Conner, Guy L.
Dempster, James H.
DeWitt, A. S.
Donald, William A.
Evans, William A.
Haas, Ernest
Harrison, Beverly D.
Harvey, John Goold
Hickey, Preston
Hitchcock, Charles W.
Holmes, Arthur E.
Hoops, G. B.
Hoskins, Neal
Inglis, David
Kiefer, Guy L.
King, Dale M.
McKean, Geo. E.
Meloy, Carl R.
Mooney, Edward W.
Northrup, Wm.
Polozker, I. L.
Rich, Herbert M.
Starkey, Frank R.
Sichler, E. H.

DETROIT—*Continued*

Stephenson, Frank
Stevens, Rollin H.
Varney, H. R.
Watkins, John T.
Wendt, Leonard F. C.
Wilson, Walter, Jr.

Flint

Burr, C. B.
Clift, M. William
Knapp, M. S.
Marshall, William H.

Grand Rapids

Baker, Abel J.
Corbus, Burton R.
Gordon, T. D.
Johnston, Collins H.
Meengs, J. E.

Granville

Brook, J. D.

Hancock

Fischer, Arthur F.

Kalamazoo

Crane, A. W.
Jackson, John B.

Lansing

Olin, Richard M.

Lapeer

Kay, W. J.

Monroe

Southworth, Chas. T.

MINNESOTA

Duluth

Linnemann, M. L.
Martin, Thomas Roy
Rowe, O. W.
Scherer, C. A.
Tuohy, Edward L.

Minneapolis

Clifford, Henry
Drake, Charles
Rizer, Robert I.
Robertson, H. E.
Schlutz, Frederick W.
Schneider, John P.
Ulrich, Henry L.

MINNESOTA—*Continued*

Rochester
Hartman, Howard
MacCarty, Wm. C.
St. Paul
Greene, Charles L.

MISSOURI

Kansas City
Duke, Wm. W.
Hoxie, George H.
Milne, Lindsay S.
Murphy, Franklin E.
St. Joseph
Bell, John M.
St. Louis
Brady, Jules M.
Clemens, J. R.
Englebach, William
Lyter, J. Curtis
Neilson, Charles Hugh
Smith, Elsworth B.
Zahorsky, John

MONTANA

Helena
Fligman, Louis H.
Miles City
Brown, George E.

NEBRASKA

Lincoln
Mayhew, John Mills
Norfolk
Foster, Robert H.
Omaha
Crummer, Leroy
Clarke, Floyd
Christie, B. W.
Dunn, A. D.
McClanahan, H. M.
Milroy, Wm. F.
Riley, Bryan M.
Sachs, Adolph

NEW JERSEY

Atlantic City
Alsop, Thomas
Stewart, W. B.
Elizabeth
Stern, Arthur

NEW JERSEY—*Continued*

Glen Ridge
Wallace, Henry
Greystone Park
Evans, Britton D.
Fisher, Ernest M.
Hackensack
McFadden, J. Howard
Montclair
Mabey, J. Corwin
Newark
Beling, C. C.
Bumsted, C. V. R.
Connolly, Richard N.
Elliott, Daniel
Kraker, David A.
Steiner, Edwin
Teeter, Charles Edwin
Secaucus
King, George W.
Pollak, B. S.
Trenton
McDonald, J. C.

NEW YORK

Albany
Conway, Fred C.
Rooney, James F.
Brooklyn
Bartley, E. H.
Blatters, Simon R.
Brush, Arthur C.
Butler, Glentworth
Cornwall, Edward E.
Clark, Raymond
Cross, Frank B.
Cruikshank, William J.
Eastmond, Chas.
Evans, George A.
Fairbairn, Henry A.
Forbes, George
Gutman, Jacob
Ives, Robert F.
Joachim, Henry
Kerr, LeGrand
Keyes, E. P.
Kingman, Robert
Klein, Abraham
Knadt, Hartwig
Little, George F.
Louria, Leon

BROOKLYN, N. Y.—*Continued*
Ludlum, Walter D.
Macumber, John L.
Meagher, John F. W.
Moser, William
Moses, Henry B.
Northridge, N. A.
Parrish, Paul L.
Reque, P. A.
Smith, Archibald D.
Van Cott, J. M.
Wallace, Wesley H.
Wolfer, Henry
Warren, Luther
Webster, Henry C.

Buffalo
Benedict, A. L.
Kauffman, Lesser
Rice, James F.
Walsh, Thomas J.

Forrest Hills
Chalmers, Thomas C.

Newburgh
Gleason, W. Stanton

New York City
Baketel, H. Sheridan
Berg, Henry
Bishop, Ernest S.
Bishop, James
Bishop, Louis
Blumgarten, A. S.
Bovaird, David
Brooks, Harlow
Byrne, Joseph Henry
Byrne, Joseph
Caille, Augustus
Carman, Albro R.
Cooke, Robert A.
Fisch, Gustaf Grant
Friedman, G. A.
Goodhart, S. Philip
Gordon, Murray B.
Grossman, Morris
Herrman, Charles
Herrick, W.
Hirsch, Isaac
Holland, Arthur L.
Hollis, A. W.
LeWald, Leon T.
Maier, Otto

NEW YORK CITY—*Continued*
Mannheimer, George
McKendree, Chas. E.
Meyer, Alfred
Nagle, James F.
Pease, Marshall C., Jr.
Philips, Carlin
Quackenbos, Henry F.
Quintard, Edward
Ramirez, Max A.
Reilly, Thomas F.
Rottenberg, I. M.
Sachs, L. B.
Satterthwaite, Thomas E.
Shelby, Edmund P.
Stark, Morris
Starr, M. Allen
Stewart, W. H.
Strodl, George T.
Sturtevant, Mills
Weber, Leonard G.
Wilcox, Reynold Webb
Winter, Henry Lyle
Woodbury, Malcolm S.

Poughkeepsie
Hill, Eben C.

Rochester
Button, Lucius
Darrow, Charles
Mulligan, Wesley T.
Sutter, C. Clyde

Schenectady
Betts, Lester
Ham, Stillman S.
Gould, L. A.
Scott, J. M. W.
Stone, W. B.
VanderBogart, F.

Stapleton, S. I.
Foster, Albert D.

Syracuse
Larkin, Albert E.
Levy, Harris I.

Watkins
Ferris, A. W.

NORTH CAROLINA

Charlotte
Munroe, John P.

Hoke County
McBrayer, L. B.

NORTH DAKOTA

Bismarck
Arnson, Julius O.
Ruediger, Ernest
Mandan
Altnow, H. O.

OHIO

Cincinnati
Bettman, Henry Wald
Cummer, C. L.
Cleveland
Stone, Charles W.
Stoner, C. Willard
Springfield
Syman, Louis L.
Toledo
Brown, N. Worth
Levison, Louis
Salzman, Samuel
Tenney, C. F.
Youngstown
Morrison, Robert
Patrick, Henry E.

OKLAHOMA

Norman
Ellison, Gayfree
Oklahoma City
Andrews, Leila E.
Chase, A. B.
Fishman, C. J.
Moorman, L. J.
Riely, Leander A.

OREGON

Portland
Baar, Gustav
Koehler, George F.
Matson, Ralph C.
Sellings, Lawrence

PENNSYLVANIA

Germantown
Kelley, Thomas C.
Philadelphia
Allyn, Herman B.
Bernstein, Ralph
Beardsley, Edward J. G.
DaCosta, J. R., Jr.

PHILADELPHIA—*Continued*
Gordon, Alfred
Mills, H. B.
Rehfuss, Martin E.
Robertson, William E.
Roussell, Albert E.
Sajous, Chas. E. DeM.
Pittsburgh
Barach, Joseph H.
Billings, T. D.
George, S.
Grauson, Thomas Wray
Haythorn, Samuel
Hollander, Lester
Johnston, George C.
Johnston, J. I.
Jones, Clement R.
Lichty, John A.
McCreedy, E. Bosworth
McKelvey, James P.
Mercur, Wm. H.
Ohail, Joseph C.
Thorne, John Mairs
Republic
Kimmel, M. S.
York
Comroe, Julius H.
Holzapple, C. E.

RHODE ISLAND

Providence
Farnell, Fred J.

SOUTH DAKOTA

Watertown
Koren, Finn

TENNESSEE

Memphis
Krauss, William
Leroy, Charles
McElroy, J. B.
Warr, Otis

TEXAS

Houston
Agnew, James
Waples, F. A.

UTAH

Salt Lake City
Gibson, F. Cattett
Richards, C. G.

VERMONT

Burlington
Beecher, Charles Henry

VIRGINIA

Charlottesville
Davis, John S.
Richmond
Brown, Alexander G.
Gray, Alfred L.
Hodges, J. Allison
McGuire, Edward
Shepard, William A.
Vander Hoof, Douglas

WASHINGTON

Seattle
Blackford, J. M.
Heussy, William C.
Stith, Robert M.
Tacoma
Brown, J. R.
Nilson, C. Stewart
Wilson, Charles S.

WEST VIRGINIA

Clarksburg
Cherry, Solomon
Huntington
Vest, Walter E.

WISCONSIN

Fond du Lac
Layton, Oliver M.
Milwaukee
Henes, Edwin
Jermain, Louis
McJunkin, Frank A.
Patek, Arthur J.
Warfield, Louis

CANADA

Brandon, Manitoba
Carter, L. J.

Fredericton, N. B.
VanWart, George

London, Ontario
Crane, James W.
Ferguson, J. I.
Hale, George, C.
Hughes, F. W.
Lindsay, John C.
MacGregor, John

Montreal, Quebec
Benoit, Em. P.

Toronto
Elliott, J. A.
London, J. D.

Winnipeg, Manitoba
Burridge, A. J.
Cadham, F. T.
Chestnut, William
Hunter, Charles
Mackey, Hugh
McMillan, J. Currie
Montgomery, E. W.
Moody, A. W.
Murdoff, H. M.
Rogers, William
Young, Fred A.

ROSTER OF MEMBERS OF THE AMERICAN CONGRESS ON INTERNAL MEDICINE TO MARCH 1, 1920

Alabama

Mobile
Roe, Lee Wright

Arkansas

Hot Springs
Deaderick, Wm. H.
Eckel, Geo. Mitchell
Thompson, Lloyd

Little Rock
Bathurst, Wm. R.

California

Burbank
Rossiter, Frederick

Colfax
Peers, Robert

Coronado
Yates, John C.

Glendale
Harrower, Henry
Keller, P. M.

Los Angeles
Brooks, Herbert T.
Barrow, John V.
Browning, Charles C.
Byrnes, Ralph
Campbell, Ralph R.
Crispin, Edgerton L.
Crum, Robert
Cummings, Rolland
Fishbaugh, E. C.
Frick, Donald
Granger, Arthur S.
Hart, Lasher
Hunter, George G.
King, Jos. M.
Lissner, Henry H.
Moore, Ross
Newton, E. Avery
Orbison, Thomas J.
Piness, George
Scott, Alfred James, Jr.
Soiland, Albert

Los Angeles—*Continued*
Taylor, F. W. Howard
Wessels, Walter
Visscher, L. G.

Monrovia
Pottenger, Francis M.

Oakland
Rowe, Albert H.
Strietman, Wm. H.

Pasadena
Breed, Lorena
Condit, Joseph
Luckie, James
Mackerras, R. H.
Stone, Willard J.
Wilson, J. M.

Redlands
Folkins, Frank H.

Riverside
Simonds, Paul

Sacramento
Gundrum, F. F.

San Diego
Churchill, James F.
Nielsen, John C. E.
Pickard, Rawson
Pollock, Robert

San Francisco
Lux, Frederick W.
Spier, Harry
Voorsanger, Wm. C.

San Leandro
Miller, Charles Howard

Colorado

Boulder
Gilbert, Oscar Monroe

Denver
Arndt, Rudolph W.
Arneill, James Rae
Bonney, Sherman G.
Burnett, C. T.

DENVER—*Continued*

Hall, Josiah N.
Love, Tracy
Neuhaus, G. C.
Waring, James J.

CONNECTICUT

Bridgeport

Lynch, John C.

Hartford

Altshul, H.
Witter, Orin R.

New Haven

Gompertz, Louis M.
Levy, Louis Henry

DISTRICT OF COLUMBIA

Washington

Barnes, Noble P.
Conklin, C. B.
Grayson, Cary T.
Heller, Joseph M.
Lee, Thomas B.
Mallory, Wm. J.
Morgan, Wm. G.
Reede, Edward H.
Roy, Philip S.
Verbrycke, J. Russel

FLORIDA

Jacksonville

Dollear, A. H.
Love, James
McGinnis, R. H.

Miami

Benton, G. H.

GEORGIA

Atlanta

Bunce, Allen H.
Lowrence, Charles Ed.
Paine, C. H.

Augusta

Mulherin, W. A.
Murphey, Eugene E.

LaGrange

Huck, J. Gardiner

ILLINOIS

Chicago

Anderson, James L.
Babcock, Robert H.
Berghoff, Robert S.
Black, Robert Alfred
Blackwood, A. L.
Block, Leon
Cramp, Arthur J.
Croftan, Alfred C.
Cross, Edwin
Fantus, Bernard
Favill, John
Fergnson, Clara
Frick, Anders
Frinch, Robert L.
Futterer, Gus A.
Goldberg, Benjamin
Goldsmith, A. A.
Graves, Nathaniel A.
Gray, Ethan A.
Gray, Herbert W.
Grubbe, Emil
Gruskin, B.
Heintz, Edward L.
Hickenlooper, C. B.
Hoyne, Archibald L.
Hubeny, Maximilian John
Jacque, John L.
Karshner, Clyde F.
Kaufmann, Gustav
Krafft, Jacob C.
Leonard, Edward F.
Lewison, M.
Martin, Albert
Meling, Nelson C.
Metcalf, Walter B.
Moyer, Harold
Norden, H. A.
Orndoff, Benjamin
Patton, Joseph M.
Pietrowicz, S. R.
Portis, Milton M.
Post, Geo. W.
Quinn, Wm.
Roach, Richard A.
Semphill, Robert A.
Seufert, E. C.
Sheets, Vaughn L.
Slaymaker, S. R.

CHICAGO—*Continued*

Smithies, Frank
Sterns, Wm. G.
Tice, Frederick
Trapp, Albert R.
Trostler, I. S.
Withers, G. H.

Cicero

Barnes, James

Danville

McCaughey, Robert S.

Elgin

Gabby, S. K.
Hinton, Ralph

Decatur

Jack, Cecil

Evanston

Hastings, W.

Hoopeston

Jones, Leroy

Jacksonville

Norbury, Frank P.

Joliet

Werner, Fredrick Wm.

Moline

Beam, Hugh A.

Peoria

Brown, D. A.
Meixner, Fred M. F.
Parker, George
Vonachen, J. R.

Rockford

Anthony, R. E.
Mosley, H. P.
Weld, Anna

Springfield

Herndon, Richard F.
Norbury, Frank Parsons

Winnetka

Blatchford, F. W.

INDIANA

Fort Wayne

McCaskey, George

Indianapolis

Ketchum, Jane M.
Lapenta, Vincent A.
Olsen, Alfred B.

INDIANAPOLIS—*Continued*

Schweitzer, Ada
Wynn, Frank B.

South Bend

Cooper, H. L.
Sensenich, R. L.

IOWA

Centerville

Marker, John I.

Davenport

Decker, H. M.

Des Moines

Bierring, Walter L.
Ryan, Granville N.
Throckmorton, Tom B.
Welpton, Hugh G.

Dubuque

Keogh, John V.

Fairfield

Gaumer, James Stewart

Keokok

Fuller, Frank

Maquoketa

Bowen, A. B.

Mason City

Farrell, V. A.

Sioux City

Meis, E. W.
Shuman, John W.

Webster City

Galloway, M. B.

KANSAS

Halstead

Baumgartner, E. A.

Herington

Reichley, Elmer J.

Lawrence

Nelson, C. F.

Milford

Brinkley, John R.

Wichita

Hoffman, J. Z.
Jager, T. J.

KENTUCKY

Lexington

Bradley, Ernest B.
Scott, John W.

KENTUCKY—*Continued*

Louisville

Barbour, Philip F.
Bate, R. Alex.
Bayless, B. W.
Dowden, C. W.
Finck, T. D.
Fleischaker, F. W.
Graves, Stuart
Griswold, Alex. V.
Hays, George
Horine, Emmet F.
Jenkins, William A.
Keith, D. Y.
Lucas, C. G.
Meyers, Sidney J.
Moore, John Walker
Moren, John J.
Morrison, J. R.
Nickell, A. W.
Thompson, Cuthbert
Tuley, Henry Enos
Young, W. J.

LOUISIANA

New Orleans

Bass, Charles
De Buys, L. R.
Lemann, Isaac Ivan
Lyons, Randolph H.
Tichenour, G. H., Jr.
Van Wart, Roy M.

MAINE

Newport

Anderson, W. W.

Portland

Burrage, Thomas J.
Gehring, E. W.

MARYLAND

Annapolis

Bloedorn, W. A.

Baltimore

Beck, Harvey G.
Hemmeter, John C.
Leitz, Frederick
Love, William S.
Magruder, W. Edw.

BALTIMORE—*Continued*

Miller, Sydney R.
O'Mara, John T.
Shearer, Thos. L.
Simon, Charles E.
Zueblin, Ernest

Chevy Chase

Morgan, James Dudley

Snow Hill

Riley, John L.

MASSACHUSETTS

Boston

Austin, A. E.
Bangs, Charles H.
Briggs, D. Vernon
Brown, Percy
Dana, Harold W.
Granger, Frank B.
Jelly, Arthur C.
McCrudden, Francis H.
Otis, Edward O.
Overlander, C. L.
Smith, John Hall

Salem

Sargent, Ara N.

Springfield

Bacon, Theodore S.

Worcester

Baff, Max
Bigelow, Edward B.

MICHIGAN

Ann Arbor

Cowie, David Murray
Gordon, Wm. Henry
Klingman, Theophil
Marshall, Mark
Parnell, C. G.
Warthin, Aldred Scott
Van Schoick, John

Battle Creek

Heald, C. W.
Mortensen, M. A.
Nelson, A. W.
Pitchard, J. S.
Stewart, Charles E.

Bay City

McLurg, John

MICHIGAN—*Continued*

Detroit

Aaron, Charles D.
Biddle, Andres Porter
Breisacher, Leo
Buesser, Frederick G.
Carlucci, P. F.
Carstens, Henry R.
Chester, John L.
Cleland, James, Jr.
Clippert, Frederick
Conner, Guy L.
Dempster, James H.
DeWitt, A. S.
Donald, William M.
Evans, W. A.
Haas, E. W.
Harrison Beverly D.
Harvey, John Goold
Hickey, Preston M.
Holmes, Arthur
Hoops, G. B.
Hoskins, Neal
Inglis, David
Ives, Augustus W.
Jennings, C. G.
Jennings, Alpheus F.
Kiefer, Guy L.
Lee, John
Lockwood, Bruce C.
McClintic, C. F.
McGraw, Theo. A., Jr.
McKean, Geo. E.
McNaughton, Geo. P.
Meloy, Carl R.
Mooney, Edward W.
Polozker, I. L.
Rich, Herbert M.
Schmidt, Harry B.
Sherman, G. H.
Sichler, E. H.
Stapleton, Wm. J.
Starkey, Frank R.
Stephenson, Frank
Stevens, Rollin
Stiles, C. H.
Ulbrich, Henry L.
Varney, H. R.
Vreeland, C. Emerson
Watkins, John T.

DETROIT—*Continued*

Wendt, Leonard F. C.
Wilson, Charles Stuart
Wilson, Walter J.
Zugsmith, Edwin

Flint

Burr, G. B.
Clift, M. Wm.
Knapp, M. S.
Marshall, William H.

Grand Rapids

Baker, Abel J.
Corbus, Burton R.
Gordon, T. D.
Irwin, Thomas C.
Johnston, Collins H.
Meengs, J. B.
Moore, Vernon
Northrup, Wm.
Wells, M.

Granville

Brook, J. D.

Hancock

Fischer, Arthur F.

Kalamazoo

Crane, A. W.
Jackson, John B.

Lansing

Olin, Richard M.

Lapeer

Kay, W. J.

Monroe

Southworth, Chas.

St. Joseph

Bell, John M.

MINNESOTA

Duluth

Linneman, N. L.
Martin, T. R.
Rowe, Olin W.
Scherer, C. A.
Tuohy, E. L.

Minneapolis

Beard, Archie
Crafts, Leo M.
Drake, Charles
Gardner, Edward L.
Head, George Douglas
Henry, Clifford E.
Morrison, A. W.

MINNEAPOLIS—*Continued*

Peppard, Thomas Albert
Rizer, Robert I.
Robertson, H. E.
Schlutz, Frederick W.
Schneider, John P.
Ulrich, Henry L.

Rochester

Hartman, Howard R.
MacCarthy, Wm. C.

St. Paul

Bosworth, Robinson
Burns, Robert M.
Gager, Edward C.
Green, Charles Lyman
Hall, Alexander
Hoff, Peder A.
Lepak, John A.

MISSOURI

Kansas City

Bohan, P. T.
Duke, Mm. W.
Fassett, Charles W.
Hamilton, Hugh D.
Holbrook, Ralph
Hoxie, George H.
Lynch, L. A.
McPherson, Owen P.
Milne, Lindsay S.
Murphy, Franklin E.
Wilson, S. Meyers
Wolf, I. J.

St. Louis

Baumgarten, Walter
Brady, Jules M.
Butler, L. P.
Clemens, J. R.
Engelbach, William
Hughes, Marc Ray
Lyter, J. Curtis
MacFadden, James F.
Neilson, Charles Hugh
Smith, Elsworth
Zahorsky, John

MONTANA

Helena

Fligman, Louis L.

Livingston

Pampel, B. L.

MONTANA—*Continued*

Miles City

Brown, George E.

NEBRASKA

Lincoln

Mayhew, John Mills
Smith, Arthur

Norfolk

Barry, Augustus C.
Foster, Robert A.
Pollack, Fredolph

Omaha

Ballard, C. H.
Christie, B. W.
Clarke, Floyd
Coulter, F. E.
Crummer, Leroy
Dunn, A. D.
McClanahan, H. M.
Milroy, Wm. F.
Riley, Bryan
Sachs, Adolph
Tyler, Albert F.

NEW JERSEY

Atlantic City

Alsop, Thomas
Jonah, William E.
Stewart, W. Blair

East Orange

Gray, T. N.

Elizabeth

Stern, Arthur

Glen Ridge

Wallace, Henry

Greystone Park

Donnet, John Victor
Evans, Britton D.
Fisher, Ernest M.
Henschel, Louis K.
Thorne, Frederick H.

Hackensack

McFadden, G. Howard

Hoboken

Von Deesten, Henry T.

Jersey City

Cassidy, John M.

Montclair

Mabey, John Corwin

NEW JERSEY—*Continued*

Newark
Beling, C. C.
Bumsted, C. R.
Connolly, Richard
Dowd, Ambrose F.
Elliott, Daniel
Lowrey James H.
Martland, Harrison
Teeter, Charles E.

Nutley
Whelan, Edward P.

Paterson
Surnamer, Isaac

Rockaway
Flagg, Frederick W.

Secaucus
Pollak, B. S.

Town of Union
Curtis, Grant P.

Trenton
McDonald, John O.

NEW YORK

Albany
Conway, F. C.
Cox, F. J.
Rooney, James F.

Auburn
Gerin, John

Binghamton
Lape, George S.
Lappeus, G. C. S.
Overton, W. S.

Brooklyn
Andresen, A. F. R.
Aten, William, H.
Banowitch, Morris M.
Bartley, E. H.
Blatteis, Simon R.
Brockway, Robert O.
Brown, Samuel S.
Brush, Arthur C.
Bunker, Henry A.
Butler, Glentworth R.
Chapin, Edward
Clarke, Raymond
Cornwall, E. E.
Coughlin, Robert E.
Cross, Frank Bethel

BROOKLYN—*Continued*
Cruikshank, Wm. J.
Dattelbaum, M. J.
DeLorme, M. F.
DeYoanna, A.
Dobkin, Nicholas
Eastmond, Charles
Evans, George A.
Fairbairn, Henry A.
Fisher, Charles M.
Forbes, George
Gordon, Murray B.
Gutman, J.
Haugarter, Andrew H.
Hoxsie, Edward H.
Hubbard, W. S.
Ives, Robert E.
Joachim, Henry
Knadt, Hartwig
Kerr, LeGrand
Kingman, Robert
Little, George F.
Louria, Leon
Ludlum, W. D.
Macumber, John L.
MacEvitt, James M.
Meagher, John F. W.
Moser, William
Moses, Henry Monroe
Nash, Philip I.
Northridge, Wm. A.
Parrish, Paul L.
Reque, P. A.
Smith, Archibald D.
Smith, Joseph E.
Somers, J. A.
Van Cott, J. M.
Wallace, Wesley H.
Warren, L. F.
Webster, Henry G.
Wheeler, Robert T.
Wolfer, Henry

Buffalo
Benedict, A. L.
Cohen, Bernard
Eckel, John L.
Gibson, Arthur R.
Jones, Allen A.
Kauffman, Lesser
Love, F. W.

BUFFALO—*Continued*
Lytle, Albert T.
Patterson, Harold A.
Putman, James W.
Pryor, John H.
Rice, James Francis
Rochester, DeLancey
Russell, Nelson G.
Thoma, Fridolin
Ullman, Julius
Walsh, Thomas J.

Central Islip
Reed, Ralph G.

Clifton Springs
Woodbury, Malcolm
Wright, Floyd

Cornwall
Winter, Henry Lyle

Elmhurst
Schweikart, Fred J.

Forest Hills
Chalmers, Thomas

Newburgh
Gleason, W. Stanton

New York City
Amster, J. Lewis
Baketel, H. Sheridan
Berg, Henry W.
Bieber, Joseph
Bishop, Louis F.
Bishop, James
Bishop, Ernest S.
Blumgarten, A. S.
Brooks, Harlow
Burns, Geoffrey H.
Byrne, Joseph H.
Byrne, Joseph
Caille, Augustus
Carman, Albro R.
Cooke, Robert A.
Diner, Jacob
Donovan, Daniel J.
Egan, Cornelius J.
Edson, David Orr
Eichler, Philip
Field, C. Everett
Fisch, Gustav Grant
Friedman, G. A.
Goodhart, S. Philip
Gottlieb, Charles

NEW YORK CITY—*Continued*
Greeff, J. C. Wm.
Grossman, Morris
Halpern, J.
Hatch, Leffingwell
Herrick, W. W.
Herrman, Charles
Hirsch, Isaac
Hirschmann, Isador I.
Holland, Arthur L.
Hollis, A. Wm.
Hollister, Frank C.
Horowitz, Philip
Hunt, Edward L.
James, Walter B.
Jutte, Max Ernest
Katzenbach, W. H.
Laporte, George L.
Levy, I. J.
LeWald, Leon T.
Lewi, Emily
Lewis, H. Edwin
McKendree, Chas. A.
McSweeney, E. S.
Maier, Otto
Mannheimer, George
Meltzer, Victor
Meuer, S. H.
Meyer, Alfred
Monae-Lesser, Mozart
Mooney, Louis M.
Nagle, James F.
Norman, M. Philip
Pease, Marshall C.
Pfeiffer, Felix
Philips, Carlin
Pumyea, P. C.
Quackenbos, H. F.
Quintard, Edward
Reilly, Thomas F.
Richardson, E. J.
Robinson, D.
Rottenberg, I. M.
Rothenberg, L. H.
Sachs, L. B.
Satterthwaite, Thos.
Schapira, S. Wm.
Schlapp, Max G.
Scott, George D.
Shelby, E. P.

NEW YORK CITY—*Continued*

Sheldon, Wm. H.
Sillo, Valdemar
Stark, M.
Starr, M. Allen
Stella, Antonio
Stewart, Wm. H.
Strodl, George T.
Sturtevant, Mills
Thom, Burton Peter
Titus, Edward C.
Turck, Fenton B.
Vaux, Charles L.
Wachsmann, S.
Weber, Leonard G.
Weinstein, Julius
Weiss, Samuel
Welker, Franklin
Wilcox, R. W.
Wilson, George A.
Youngling, George S.

Niagara Falls

McBlaine, Thomas J.

Ogdensburg

Cooper, W. Grant

Poughkeepsie

Hill, Eben C.
Von Tiling, Johannes

Rochester

Button, Lucius L.
Darrow, Charles E.
Ewers, Wm. V.
Jackson, Edward W.
Lath, E. M.
Mulligan, Wesley T.
Sutter, C. Clyde
Swan, John M.
Williams, J. R.

Schenectady

Betts, Lester
Collie, Roy M.
Faust, Louis
Goddard, Walter W.
Gould, L. A.
Ham, Stillman S.
Reed, Fred C.
Scott, J. M. W.
Stone, Warren B.
VanderBogart Frank

NEW YORK—*Continued*

Syracuse

Kaufman, Franklin J.
Larkin, Albert E.
Levy, I. Harris
Loveland, B. C.
Reifenstein, Edw. C.
Wiseman, Joseph R.

Stapleton

Foster, Albert D.

Troy

Stillman, Edgar R.

Utica

Dill, George H.

Watkins

Ferris, Albert W.

NORTH CAROLINA

Ashville

Von Ruck, Silvio

Charlotte

Munroe, John P.
Nisbit, Walter O.

Hoke County

McBrayer, L. B.

High Point

Hiatt, Houston B.

Raleigh

Anderson, Albert

NORTH DAKOTA

Bismarck

Arnson, Julius O.
Ruediger, Ernest

Mandan

Altnow, H. O.

OHIO

Akron

Held, Charles E.

Cincinnati

Bettman, Henry Wald
Greiwe, John E.
Morris, Roger Sylvester
Stix, Walter H.
Wendel, Henry C.

Columbus

Sheetz, John W.
Whitaker, H. W.

OHIO—*Continued*

Cleveland
Berger, Samuel S.
Cummer, C. L.
Fliedner, G. B.
Friend, John M.
Philips, John
Stone, Charles W.
Stoner, Willard C.
Updegraff, Ralph K.

Marion
Young, Fillmore

Richwood
Roebuck, L. L.

Springfield
Syman, Louis L.

Steubenville
Bradley, John A.
Miller, J. E.

Toledo
Brown, N. Worth
Levison, Louis A.
Salzman, Samuel
Tenney, C. F.
Waggoner, C. W.
Zbinden, Theodore

Warren
Manley, O. T.

Youngstown
Morrison, R. M.
Patrick, H. E.
Rosenblum, Alex. M.
Welch, H. E.

OKLAHOMA

Norman
Ellison, Gayfree
Turley, L. A.

Oklahoma City
Andrews, Leila E.
Chase, A. B.
Moorman, L. J.
Riely, Leander A.
White, Arthur W.

OREGON

Portland
Baar, Gustav
Brill, I. C.
Keoler, George F.

PORTLAND—*Continued*
Matson, Ralph C.
Selling, Lawrence

PENNSYLVANIA

Ashland
Biddle, Robert

Corry
Christie, A. C.

Donora
Lewis, Wm. H.

Germantown
Kelly, T. C.

Johnstown
Stewart, H. M.

Norristown
Christian, T. B.
Imhoff, Hanna H.

Philadelphia
Allyn, Herman
Anders, James
Beardsley, Ed.
Bernstein, Ralph
DaCosta, J. C., Jr.
Daland, Judson
Dercum, F. X.
Dickinson, H. S.
Gordon, Alfred
Loewenburg, S. A.
Mills, H. B.
Oliensis, A. E.
Reeves, Rufus S.
Robertson, Wm. E.
Roussel, Albert
Sajous, Charles E. deM.
Smith, Ernest B.
Stewart, F. E.
Warmuth, M. P.

Pittsburgh
Alexander, J. E.
Barach, Jos. H.
Berg, G. F.
Billings, F. T.
Gardner, E. R.
George, S.
Grayson, Thomas W.
Grier, George W.
Haythorn, Sam
Hollander, Lester
Hood, Robert T.

PITTSBURGH—*Continued*
Johnston, G. C.
Johnston, J. I.
Jones, Clement R.
Lichty, John A.
Litchfield, L.
Mayer, Ed. E.
Mayer, W. H.
McCready, E. B.
McKelvey, J. P.
Ohail, J. C.
Palmer, G. A.
Pettiet, Albert
Schwartz, L. L.
Sherrill, A. W.
Shilen, J.
Simonton, T. A.
Thorne, F. M.
Utley, F. B.
Westervelt, H. C.
Wolf, Jacob
Zeedick, Peter I.

Reading
Bertolet, Wm. S.

South Bethlehem
Butler, Thomas

Uniontown
Smith, Charles H.

Vandergrift
Speer, Ross

Washington
Sargent, L. D.

Wilkes-Barre
Collins, Daniel W.
Kaufman, Albert

York
Comroe, Julius H.
Holtzapple, G. E.

RHODE ISLAND

Providence
Farnell, Frederick J.

SOUTH CAROLINA

Florence
Barnwell, John M.

SOUTH DAKOTA

Jara
Rosenthal, Sigmond

TENNESSEE

Knoxville
Bowen, William

Memphis
Cullings, Jesse J.
Fontaine, Bryce W.
Krauss, Wm.
Jones, Frank A.
Leroy, Louis
McElroy, J. B.
Rudner, Henry G.
Swink, Walter T.
Warr, Otis

Nashville
Dunklin, F. B.
Witherspoon, John

TEXAS

Dallas
Calvert, W. J.

Galveston
Chapman, L. E.
Graves, M. L.
Levy, Moise D.
Stone, C. T.

Houston
Agnew, James H.
Waples, F. A.

Temple
Gober, O. F.

UTAH

Salt Lake City
Cochran, Geo, A.
Gibson, Catlett T.
Rich, Wm. L.
Richards, C. G.

VERMONT

Battleborough
Lane, Winfred

Burlington
Beecher, Clarence Henry

VIRGINIA

Charlottesville
Davis, John Staige

Norfolk
Grandy, Charles R.
Silvester, Millis Wilson

VIRGINIA—*Continued*

Richmond

Brown, Alexander G.
Gray, Alfred L.
Hodges, Fred M.
Hodges, J. Allison
Houser, A. A.
Hutcheson, J. M.
McGuire, Edward
Shepherd, Wm. A.
Vander Hoof, Douglas

WASHINGTON

Seattle

Blackford, J. M.
Heussy, William C.
Stith, Robert M.

Tacoma

Brown, J. R.
Neilson, C. Stuart

WEST VIRGINIA

Clarksburg

Cherry, Solomon

Huntington

Vest, Walter E.

WISCONSIN

Barron

Post, C. C.

Fond du Lac

Calvy, P. J.
Layton, Oliver M.

Madison

Blankinship, Ray C.
Carter, Homer M.
Fahr, Geo. Elveston

Marshfield

Milbee, H. H.
Turgasen, F. E.

Milwaukee

Henes, Edwin
Jermain, Louis
McJunkin, Frank A.
Warfield, Louis M.

Oshkosh

Andrews, Neil
Werner, O. E.

CANADA

Brandon, Man.

Carter, L. J.

Fredericton, N. B.

Van Wart, George Clowes

London, Ont.

Crane, James W.
Ferguson, J. I.
Fischer, S. M.
Fishman, C. J.
Hale, George C.
Hughes, F.
Lindsay, John
MacGregor, John A.

Montreal, Quebec

Benoit, Em. P.

Toronto, Ontario

Elliott, J. A.
Lowdon, J. D.
McPhedrum, J. H.
Minns, F.

Winnipeg, Man.

Burridge, A. J.
Chestnut, William
Cadham, F. T.
Gilmour, C. R.
Hunter, Charles
Mathers, Alvin T.
Mackay, Hugh
McMillan, J. Currie
Montgomery, E. W.
Moody, Arthur W.
Murdoff, H. M.
Rogers, William
Young, Fred A.

RELATION OF THE BACTERIOLOGY TO THE PATHOLOGY OF THE TONSILS AND THE RELATION OF EITHER OR BOTH TO SYMPTOMATOLOGY

BY LOUIS A. TURLEY, A.M., M.D., PH.D., F.A.C.P.

Professor of Pathology and Histology, and Assistant Dean, University of Oklahoma School of Medicine
Pathologist to St. Anthony's Hospital, Pathologist to University Hospital, Oklahoma City,
Okla.; Consulting Pathologist to El Reno Sanitarium, El Reno, Okla.; Consulting Pathologist, Oklahoma Psycopathic Hospital, Norman, Okla.

OKLAHOMA CITY, OKLA.

EVER since the fact was first recognized that the absorption of bacterial toxins in long-continued small amounts is responsible for many of the symptoms which the physician is called upon to alleviate, the tonsils have been accused of being one of the most prolific sites of this toxin production. As a result of this, the removal of tonsils has become more and more frequent, until, as in one case of this series, the tonsils were removed to alleviate a pain in the hip and leg when there was no history of any trouble with the tonsils themselves nor with the pharyngeal region. It appears that the tonsils are removed for all sorts of reasons.

If the absorption of toxins has the importance that is at the present time granted to it, the removal of the tonsils, if it were possible, might be recommended along with the tying off of the umbilical cord at the time of birth. Certainly, from an academic standpoint, the tonsils are fully convicted before the court opens, for the following reasons: First, because of their location. Every breath of air we breathe, and every mouthful of food or drink swallowed must pass the tonsils, so that the opportunities for infection there are far greater than in any other part of the body. Second, because of their structure and the warmth and moisture of the region, there is certainly no better place in the body for the growth and activities of bacteria, every requirement of food, moisture, warmth and gaseous environment being provided in just the right degree to increase the virulence of the obligate parasites and to increase the pathogenic activities of the facultative parasites. Nevertheless the tonsils have been ably defended, and the question is not yet settled. In this connection the question has also arisen as to whether or not it could be shown, by laboratory methods, that there is any real basis for the facts that have been pretty well conceded from clinical experience. For the purpose of throwing some light on this phase of the controversy a series of investigations was undertaken to find out whether there was any relation between the bacteriology and the pathology of the tonsils, and whether there was any relation between either the bacteriology or the pathology, or both, and symptomatology.

In carrying out these investigations the cases were in no way selected, but the tonsils as they were removed were studied without regard to age, sex, color, or other conditions, with the idea of throwing all possible light on the subject, and without the prejudice of any preconceived ideas. Further, each case was studied separately, without any comparison with the results of any other case, the bacteriology being carried on by one person and the pathology by another, and no comparison or study of the results made of any case until all of the data in regard to every case of the series were in hand. The symptomatology of the cases was obtained

from the case histories taken by the interns and the physicians in charge of the cases and from hospital records. This was the last data to be collected and considered, so that in no case did the laboratory workers know the reasons for the tonsillectomy.

Of course, the results of this series are only preliminary to another series of a great many more cases that should be run, and any conclusions that may be drawn from the data of this series must of necessity be only tentative; but it was hoped that sufficient facts could be obtained to stimulate those concerned to carry on a series of similar investigations of sufficient length to make the results of real scientific value.

In conducting these investigations, the interns and physicians were asked to take careful histories of the patients, with special reference to conditions that could be traced to the absorption of bacterial toxins, such as neuritis, myositis, nephritis, etc. The surgeons were asked to remove the tonsils in as nearly one piece as possible, and under as nearly aseptic conditions as possible, so that there would be no contamination or as little as possible. The tonsils, when removed, were immediately placed in sterile bottles and were brought to the laboratory as soon as possible after removal.

On reaching the laboratory the specimens were transferred to sterile Petri dishes, without handling, and were measured and a gross description made. Material was then taken from the crypts by means of a sterile platinum loop. A loopful of this material, approximately a cubic millimeter, was placed in one c. c. of sterile distilled water. This material was thoroughly mixed with the water by shaking. One-tenth of a cu. mm. of this suspension was transferred by means of a sterile pipet to nine and nine-tenths cu. mm. of sterile distilled water in a sterile container. This made a 1 : 1000 dilution of the original material. The tonsils were then seared with a hot spatula, cut open with a sterile knife, and a loopful of the material was taken from the center of the specimen and treated in the same way as the material from the crypts. That is, the same dilution was made in the same manner.

One c. c. of each of the diluted suspensions was placed in a Petri dish for culture. The medias used were plain agar, dextrose agar with whole sheep's blood added to detect hemolytic action, and Conradi-Drigalski media for the possible members of the typhoid-colon group. The inoculated plates were placed in the incubator at 37.5°C. for twenty-four hours and examined. The number of colonies with any characteristics, such as color reactions, gas, shape, size, and general physical appearance, were noted. The plates were then incubated for another twenty-four hours and the colonies examined for the morphology of the bacteria present, and where there was any indication, subcultures were made for further study.

When the material for the bacteriological studies had been obtained, the tonsils were taken to the pathological laboratory and were fixed in 4 per cent. formaldehyd and run through by the usual methods for histological study and examination of the tissues. Sections were stained with hematoxylin-eosin for general pathological cytology and also by special methods for the detection of tubercle bacilli.

As mentioned above, when all of the bacteriological and all of the pathological data of all of the cases was complete, the records of the hospital were consulted and the symptomatology of the cases obtained from the case histories. And when all available data had been collected and tabulated the cases were considered, each by itself and by comparison with the other cases, from each of the three sources of information, and such conclusions were drawn as seemed warranted. A complete report of the investigations and the conclusions drawn follows.

The series consists of 36 cases of tonsillectomy. The patients ranged in age from four to forty-one years. The largest number of patients of any one age was 4 cases eight years old, and the second largest number of any one age was 3 cases thirty-nine years old. In the series, 13 were males and 23 were females. Of the 4 cases eight years old, 3 were females, and of the 3 cases thirty-nine years old, 2 were males. The males were

pretty evenly scattered at all ages up to thirty years, but in the fourth decade the males were in a larger percentage than in any other decade.

The question now arises as to whether females are more subject to conditions suggesting tonsillectomies than are males; or, those conditions being present, do females seek relief more often than males; was a tonsillectomy performed when something else should have been done; was it a mere coincidence that females were in the majority in this series? All of these are possible phases of the question that can be answered only by further study, but the fact that the great majority of cases were females—almost two-thirds of the series— should demand investigation, being of too much importance to be passed as a mere coincidence.

INVESTIGATION

For the purpose of certain comparisons the cases were divided, according to the age of the patients, as follows: children, up to 10 years of age inclusive; youths, from 11 to 20 years inclusive; and adults, all over 20 years of age.

Size of the Tonsils.—In children the largest tonsils were 32 x 23 mm., in a girl of 8 years. The smallest were 16 x 14 millimeters, in a girl of 10 years; the average size of the tonsils in children was 23.6 x 16 mm. Among the youths the largest tonsils were 31 x 29 mm., in a male of 17 years; the smallest were 21 x 18 mm. in a female of 12 years, and the average size was 24 x 18 mm. Among the adults the largest tonsils were 30 x 29 mm. in a female of 29 years; the smallest were 10 x 8 mm. in a female of 39 years, and the average was 24.8 x 18.2 mm. In the case of the smallest tonsils in the adult group, the patient had had a tonsillectomy ten years previously or at the age of 29 years. This might account for the small size of her tonsils. But the case has another interest from the fact that her previous tonsillectomy was performed at an age when the tonsils are supposed to be undergoing retrogression, yet they appeared again as would have been expected had she been a child. The next smallest tonsil was 17 x 12 mm. in a female of 33 years.

It will be noted that the largest pair of tonsils were in a child. It will also be noted that there is very little difference in the size of the average tonsils in the several groups of this series. This would seem to indicate that the tonsils do not tend to decrease in size, as is generally thought.

Bacteriology.—The average number of bacteria per c. c. in all of the cases of the series was as follows: Crypts, average of 25 cases, 1,624,680; centers, average of 23 cases, 1,216,956; bacteria too numerous for estimation, crypts 3 cases, centers 3 cases; no bacteriological report on numbers of bacteria, crypts 8 cases, centers 10 cases.

The number of bacteria per cu. mm. in children: crypts, fewest 146,000, most 3,296,000; centers, fewest 116,000, most, 3,296,000; average, crypts 2,074,000, centers 1,135,143.

Among the *youths'* group, the number of bacteria were: fewest, crypts 420,000, centers 280,000; most, crypts 4,176,000, centers 3,712,000; average, crypts 1,902,500, centers 1,495,100.

In the adults, the numbers were, fewest, crypts 10,000, centers 19,000; most crypts 3,680,000, centers 3,684,000; average, crypts 987,500, centers 812,217.

It must be remembered that these numbers are for 1 cu. m. To get the number per c. c. multiply these figures by 10 which will give in most cases, more bacteria per c. c. than would be found in ordinary sewage.

As to the kinds of bacteria found, the following list gives principally only the pathogenic bacteria, and in each case all of the pathogenic bacteria found were listed. However, the Gram-positive bacteria are listed without regard to the pathogenicity of the organisms, because it was not determined if animal inoculation was necessary. Gram-positive bacilli were found in 17 cases; Gram-negative bacilli in 19 cases, tubercle bacilli in no cases. *Bacillus influenzae* in one case. Large *Staphylococcus albus* was found in 6 cases, medium-sized staphylococci in 26 cases; small staphylococci in 4 cases; *Sta-*

phylococcus aureus in 3 cases. One case showed no staphylococci. Diplococci were found in one case; streptococci in no cases; pneumococci in 3 cases. There was no bacteriological report on the morphology of the bacteria found in 5 cases.

One point of interest in connection with the staphylococci found was the difference in size. They were all *Staphylococcus albus.* Some years ago, during the epidemic of cerebrospinal meningitis, it was noticed that there were two distinct sizes of organisms found in the spinal fluid, a large and a small one. It was also noticed that in all cases where the small form occurred the prognosis was invariably more grave than when the organism was of the large form, and the greatest number of fatalities occurred in these cases. Now when this variation in size was met with among the same species of organism, in the tonsils, the question naturally arose as to whether there was any difference in the virulence of these organisms. The writer regrets that it was not possible at the time to test this out. The evidence, if any, from the symptomatology, will be discussed later.

Pathology.—For the purposes of discussion of the pathological conditions found, the tonsils were divided into the epithelium, the follicles and the stroma, and the conditions found in each of these will be considered separately.

In the epithelium, atrophy was found in 8 cases, papillae were found in 4 cases, downgrowths in 3 cases, mild infiltration of round cells in 5 cases, dense infiltration in 16 cases. In the follicles, edema was the principal condition in 6 cases, complete dense infiltration in 12 cases, marginal infiltration in 20 cases, internal focal infiltration in 4 cases. In the stroma mild increase was found in 12 cases, marked increase in 6 cases, hyaline degeneration in 5 cases, mild infiltration in 18 cases, and dense infiltration in 2 cases.

In the pathology one of the most striking features found was the papilla-like outgrowths and finger-like downgrowths of the epithelium. Both conditions resembled very closely beginning tumors, but the rareness of the occurrence of epithelial tumors, of the tonsils rather precludes the supposition that these changes were really tumors or beginning tumors, as their structure would indicate. Another point of interest was the difference in the cellular infiltration of the follicles. In some cases the margins of the follicles were so densely infiltrated that there was a definite ring around the follicle which could be seen with the naked eye. In other cases the infiltration was uniform and dense throughout the follicle. And in other cases there were foci of dense cellular infiltration within the follicle, in some cases resembling miliary abscesses, and perhaps they were beginning to be such.

Symptomatology.—A consideration of the symptomatology revealed the following facts:

Neuritis or myositis, or both, 13 cases. Respiratory tract conditions: subject to colds, 13 cases; tonsillitis, 17 cases; sore throat, 19 cases; mouth breathers, 6 cases; hay-fever, 1 case; throat trouble (rare), 3 cases; no throat trouble, 1 case. Ear trouble, as ear-ache, 10 cases; as impaired hearing, 2 cases. Kidney disorders, as pyonephritis, 1 case; kidney pain, 3 cases; polyuria, 2 cases; nocturia, 2 cases. One case having polyuria and nocturia, and kidney pains, also gave a history of loss of weight and swelling of the feet.

DISCUSSION OF FINDINGS

This brings us to the most interesting, the most baffling, and perhaps the most unsatisfactory part of the whole discussion: the relation of the pathology and bacteriology of the tonsils, and the relation of either or both to symptomatology.

So far as the pathology is concerned, such changes as the atrophy, and papilla-like and finger-like downgrowths of the epithelium can in no way be traced, or at least remotely traced, to the action of any bacteria. At least we cannot do so without bringing up the whole question of the infectious etiology of tumors. If, however, it could be shown that there was some relation, that such changes were due to some bacterial action, it

would go a long way toward proving that bacteria really played a part in the origin of tumors, if not directly, at least contributory. On the other hand, such changes as the desquamation and infiltration of the epithelium are undoubtedly due to bacterial action. The question is: Is there some constant relation between the kind of bacteria found and a given pathological condition; does desquamation take place when such and such bacteria are present, and a milder catarrhal inflammation when certain others are present, or are the two conditions merely stages in the same process and, if so, can we say that certain bacteria usually cause a catarrhal inflammation of the tonsils? So far as these investigations have progressed, the possible answer to these questions would be in a comparison of the numbers and kinds of bacteria in those cases.

Of the 7 cases in which the epithelial infiltration was most pronounced, we find the cases in which both the most and the least numbers of bacteria were found. As to kinds of bacteria, all of them contained staphylococci, 4 of them Gram-positive bacilli, 4 of them Gram-negative bacteria, and 2 of them both Gram-positive and Gram-negative bacilli; 1 of them contained pneumococci. The average number of bacteria per cu. m.m. was 1,786,000 and 1,479,000 in the crypts and centers respectively. Of the 6 cases in which there was little or no epithelial infiltration, the case having the largest, but not the case having the smallest number of bacteria for the ages in which this condition occurred was included; however, the average number of bacteria per cu. mm. (2,736,000 and 1,469,000, in the crypts and centers respectively) was, in the main, greater than in the cases of marked infiltration. Likewise all of these cases were infected with staphylococci; 3 of them contained Gram-positive bacilli, 4 of them Gram-negative bacilli and 2 both Gram-positive and Gram-negative bacilli.

Thus we see that neither the number nor the kind of bacteria can be said to have any effect on the infiltration of the epithelium. The only noteworthy fact in this connection is that of the 7 cases showing greatest infiltration of the epithelium, 4 of them were children and 2 of the other 3 were just over the line, being eleven and twelve years old; while of the 6 cases showing little or no epithelial infiltration, only 1 of them was a child. So it would seem safe to conclude that epithelial infiltration was a more common condition in children than youths or adults.

Turning now to the conditions found in the follicles we find the following facts: In cases where there was a dense marginal infiltration the average number of bacteria per cu. mm. was: crypts, 1,646,000; and centers, 1,492,000. These numbers exceeded by 22,000 the average number of bacteria found in the crypts, and by 276,000 the average number found in the centers. These cases also included not only tonsils of the child having the greatest number for that group, but also some cases that fell close to the fewest number of bacteria per cu. mm. As to kinds, all of the tonsils in which this condition was found contained staphylococci, 60 per cent. of the cases contained Gram-positive bacteria, and 40 per cent. contained Gram-negative bacteria; one case contained pneumococci. In those tonsils in which there was dense infiltration of the entire tonsil the average number of bacteria was: crypts, 2,024,000; centers, 386,000. Thus the number of bacteria in the crypts exceeded the average by 400,000, and the number in the centers fell short of the average by 848,000. These tonsils include some that were near those having the greatest number of bacteria but also included the adult case that had the least number of bacteria per cubic millimeter. As to kinds, all of these tonsils contained staphylococci, all contained Gram-positive bacteria, and 60 per cent. of them contained Gram-negative bacteria.

Here again the number of bacteria seems to have little to do with the extent of the infiltration of the follicles. So that it seems that so far as the infiltration of the follicles is concerned the difference in extent is merely one of duration of the acute condition and we may say that the pathology of the follicles

begins as an edema and that this is followed by a dense infiltration of cells beginning at the margin and extending inward until it involves the entire follicle. It is interesting to note that 60 per cent. of the cases showing marginal infiltration were children, while only 30 per cent, of those showing dense entire infiltration were children. Another fact is that there were less than the average number of bacteria in the centers in a condition in which, from the standpoint of pathology, one would expect to find the number above the average. Of the pathological conditions of the stroma and capsule —infiltration, hypertrophy and hyaline degeneration—the first of these, infiltration, in the degree found, is the condition that one would naturally expect in any inflammatory condition anywhere in any tissue. That is, the infiltration of the stroma and capsule was not remarkable enough to require any special consideration or discussion, being just what would be expected. As to the hypertrophy, in those tonsils in which this condition was at all remarkable the average number of bacteria per cubic millimeter in the crypts was 2,302,000, and in the centers, 1,491,400. These numbers exceed the average for the crypts by 678,000, and for the centers by 275,000. In only 28 per cent. of these tonsils was the number of bacteria below the average for the crypts, but 70 per cent. were below the average for the centers.

As to kinds, all of them contained staphylococci, all contained Gram-negative bacilli and 30 per cent. Gram-positive bacilli. So that the wide variance in the numbers found, and the miscellaneous kinds found again forces us to the conclusion that neither the kinds nor the numbers of bacteria have anything to do with the occurrence of hypertrophy of the stroma, and that this condition is here, as elsewhere in the body, merely an indication of a chronic inflammatory condition, merely the effort on the part of the system to strengthen and repair a weakened and infected region.

Hyaline degeneration is an intangible entity, in fact, it describes the physical appearance of tissues that have undergone a certain class of chemical changes. Just what it is we do not know, nor do we know its cause. With regard to that form of hyaline degeneration found in connective tissue, it seems to be a swelling and coalescence of the collagen fibrils that either preceeds or follows atrophy of the nuclei; and since it is always found under conditions of impaired nutrition, such as senile processes, it must be regarded as a condition attending some interference with the nourishment of the tissues. Therefore its occurrence in the tonsils signifies that those tonsils are poorly nourished, and to such an extent and in such a manner that the chemical structure of the stroma is irreparably changed.

The consideration of the bacteriology and pathology of the tonsils and the study of case by case of the comparison of the changes found and the bacteria met, leads us to the conclusion that there is no constant relation between either the number or the kinds of bacteria that produce any type of pathological condition, but rather that the type of change found is due to the immediate virulence of the bacteria or to the duration of the action. Thus a given number of bacteria of a high temporary virulence will cause a catarrhal inflammation of the epithelium and an edema, marginal or dense infiltration of the follicles, and that repeated acute attacks of a long-continued action of any number of bacteria will bring about certain hypertrophic and degenerative changes in the stroma and capsule of the tonsil.

The symptomatology that is usually referred to the tonsils is the following: neuritis and myositis, and, more recently, nephritis, with a possible third consideration which is that the tonsils are the hotbed, as it were, from which infection is transplanted to other parts of the body. The main difficulty in the consideration of the tonsils as the cause of these conditions is that the tonsils have to be studied at one particular time. This may be done at a time when they are least active, or at a time when, after having wrought the havoc of breaking down the body resistance or having poisoned other structures in the

body, they are themselves in a condition of good repair. In other words, they are in a condition, which, if it existed for a lifetime would not bring about the condition which exists in other parts of the body. And for these reasons the discussion which follows may be doubly disappointing. However the evidence will be given for what it is worth.

The youngest case of nerve trouble was in a boy of 8 years who had the following history: He had sore throat and tonsillitis at times, and was underweight. His tonsils were about average size, 25 x 20 mm. There were 2,816,000 bacteria in the crypts, and 657,000 in the center. The organisms were staphylococci and both Gram-positive and Gram-negative bacilli. The epithelium of the tonsils was almost entirely wanting, the follicles were densely infilerated with round cells, and there was hypertrophy and hyaline degeneration of the stroma. This was the youngest case in which this condition was found, i. e.; hyaline degeneration and marked hypertrophy of the stroma.

The next case of neuritis was a girl of 12 years. She was a mouth breather and had sore throat frequently. Her tonsils were well above the average in size, being 28 x 21 mm. There were 4,176,000 and 3,005,000 bacteria in the crypts and centers respectively. The epithelium of the tonsils was either wanting or obscured by a cellular infilteration; and the follicles showed either marginal or dense infiltration. The stroma was hypertrophied.

Of the five other cases on which we have a complete report, all showed hypertrophy of the stroma and two of them showed hyaline degeneration. In three of the cases the tonsils were larger than the average, one was average size, and in one the tonsils were the smallest found in any adult. This case also had the fewest number of bacteria per cubic millimeter.

One of the neuritis cases is worthy of special consideration, for the reason that the bacteria were caught in the act, as it were. In this case the patient gave the history of neuritis for three years and also of throat trouble for three years. His throat swelled until drinking was difficult. The patient took cold easily. His tonsils were 28 x 24 mm. There were 1,024,400 and 782,000 bacteria in the crypts and centers, respectively of his tonsils. The tonsillar epithelium was wanting or obscured by infiltration, the follicles showed marginal or focal internal infiltration, and the stroma was increased.

Another case that would be of even more interest, if the slides for pathological study had not been lost, gives the following history: Two months ago patient had a point of tenderness over the left ischial tuberosity. A week ago he had a sharp pain down the back of the leg; this was so intense that he had to resort to opiates for two nights in order to obtain rest. Has had no tonsillitis. Had pain in the region of the kidneys at times. Had chancroids and buboes eight or ten years ago. His tonsils were 29 x 24 mm. and contained 560,000 and 432,000 bacteria per cu. mm. in the crypts and centers. The bacteria present were, in addition to staphylococci, pneumococci and *Bacillus influenzae*.

Of the cases in which there was a history of kidney trouble, all of them showed hypertrophy of the stroma and two of them showed hyaline degeneration, both of which indicate that there was a chronic inflammatory condition of the tonsils. In one of these cases the patient had had a diagnosis of pus pocket in the lower pole of the kidney. Just what the relation of the pyonephritis was to the tonsillar condition we have no way of knowing, for the reason that no study of the tonsils was made at the time the patient was suffering from the kidney condition.

On the converse side of the proposition, there were 12 cases that showed mild hypertrophy of the stroma, 6 cases that showed marked hypertrophy, and 5 cases that showed hyaline degeneration. Of the cases showing hypertrophy, 2 were in children, and of the remaining 16 cases only 5 gave any history of kidney disturbance. This of course does not mean that the other 11 did not have nor had not had kidney trouble, for it is a well known fact that kidney disease in the form of acute nephritis may be quite ex-

tensive without manifesting any definite symptoms. If the condition has progressed until the patient does begin to complain of the symptoms, the disease is, as a rule, of long standing; and in five of this series we have patients so complaining, which would indicate rather a chronic kidney condition. It must be remembered, however, that one of the kidney cases in this series has had chancroids and buboes, and another had a positive Wassermann. Just what bearing these conditions might have on the kidney condition we do not know, but those conditions would have to be taken into consideration in a discussion of the effects of tonsillitis on kidney conditions.

One other phase of the symptomatology remains for consideration—that is, the position of the tonsils as a hotbed for the transferring of infection to other parts of the body. One patient, a woman of 29 years, had a pus appendix. Her tonsils were 30 x 29 millimeters, had 912,000 and 252,000 bacteria per cubic millimeter in the crypts and centers respectively. As to kinds, there were *Staphylococcus albus* and *Staphylococcus aureus* and *Bacillus subtilis*. She complained of rheumatism in joints and arms. The stroma of the tonsils showed hypertrophy and hyaline degeneration. There is no doubt, therefore, that she has been suffering from tonsillitis for a long time and that there has been an opportunity for a metastasis of bacteria to the appendix.

In this series, 12 of the cases gave a history of ear trouble, 10 of which were ear-ache and two were impaired hearing. Of these, 2 have a discharge from the ear at the present time, and one of them had an abscessed ear years ago. The large number—one-third of all cases—coming to tonsillectomy with a history of ear trouble seems to be significant, and it seems a safe conclusion that ear trouble can be directly or indirectly traced to tonsillar infection.

CONCLUSIONS

1. The tonsils are veritable cesspools of bacteria.

2. The principal organism found in this series was the staphylococcus, an organism of variable virulence, ordinarily causing little or no trouble, but at times becoming suddenly virulent and capable of causing intense and widespread pathological conditions. Other bacteria are found from time to time, but so far as these studies are concerned, their presence seems to have little or no effect on the extent or character of the pathological conditions of the tonsils.

3. While no definite connections can be shown between the bacteriology, pathology and symptomatology, nevertheless in cases of a history of neuritis, myositis and kidney trouble the tonsils show chronic inflammatory changes or changes due to the presence of chronic inflammation.

4. These symptoms and the pathology which accompanies them seem to depend upon the duration of the inflammation rather than upon any particular bacteria or the number of such bacteria that may be present at any one time.

In closing we wish to express our appreciation of the assistance of the surgeons and interns in securing the material for these studies.

THE GASTRO-INTESTINAL FORM OF INFLUENZA*

BY JOHN A. LICHTY, M.D., F.A.C.P.
Professor of Clinical Medicine, University of Pittsburgh
PITTSBURGH, PA.

NOTWITHSTANDING the prodigious efforts which have been put forth in the past year, during the recent epidemic of influenza, to discover the specific microorganism, it must be acknowledged that investigators are by no means in full accord as to the real cause of influenza. Any discussion, at present, from a clinical standpoint, may therefore, lead only to confusion. There is no doubt that the conception of certain "forms" of influenza which have been described in certain previous epidemics will necessarily have to be revised when once the etiology is definitely established.

About the close of the great epidemic of 1889-90, the Pfeiffer bacillus was looked upon as the specific cause of influenza. During that epidemic and even in epidemics previous to that time, certain clinical manifestations led to the designation of rather definite forms or varieties of influenza. Among these are the respiratory form, the gastro-intestinal form, the nervous form and others. For a description of these forms one may be referred to the well-known article by Dr. O. Lichtenstern on "Malaria, Influenza and Dengue," in Nothnagel's "Encyclopedia of Practical Medicine" (American Edition of Nothnagel's "Encyclopedia of Practical Medicine," pages 523 to 716).

One would infer from this able clinician that in certain cases the respiratory system is the primary seat of the disease, in other cases the gastro-intestinal tract is the primary seat of invasion and presents a definite pathology; in still other cases the nervous system is primarily affected, to the exclusion of other organs and systems, and so on. This opinion has evidently been accepted by clinicians in the numerous, almost annual, sporadic epidemics which have occurred since 1889-90. This can be seen from the abundant literature, as well as from our recollections of descriptions and of discussions of cases in our own times and experiences.

In one year it would be reported that the symptoms were largely of the gastro-intestinal tract, nausea and vomiting or diarrhea, or even a most unusual incidence of acute appendiceal attacks; in another the nervous system was the seat of the principal manifestations, extreme headache, depression, sleeplessness, etc. Because the Pfeiffer bacillus was found on the nasal mucous membrane, or even if it was not found, on account of an apparent epidemicity it was concluded the symptoms were indicative of a certain localized pathology and that it was a form or type of influenza. These diagnoses, in so far as our experience is concerned, and in so far as we can glean from the literature, were rarely verified by an autopsy or by such definite bacteriological findings as we are accustomed to exact in disease from other causes.

If one will read carefully the description of the pathology given in Lichtenstern's article on influenza, he will be impressed with the fact that it is chiefly and primarily of the respiratory system and not of the nervous system, gastro-intestinal tract, etc., notwithstanding his classification of "forms." The pathology which he does describe as occasionally found in the gastro-intestinal tract, such as a hemorrhagic condition, swelling of Peyer's patches, etc.,could readily be explained as being coincident or secondary, as may be found in the course of any acute infection. It seems quite obvious, therefore, that the

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seat of the primary infection of influenza is in the respiratory system and tract. It has certainly been so in this past epidemic, as will be shown later.

It does not necessarily imply that epidemics in past years may not have differed in their symptomatology. All of us who have had experience with so-called influenzal epidemics will recall that in one year the symptoms were largely those of the nasal cavity and the associated sinuses, in another year of the tonsils and pharynx, in another year of the middle ear and eustachian tubes, in another year of the larynx and trachea, and again in another year, as in the recent epidemic, principally of the bronchioles and lung parenchyma. But it was always of the respiratory system. In some epidemics the infection was so mild as to be almost imperceptible and apparently negligible, in others it was extremely grave. If it should seem desirable to classify the forms of influenza, it would appear that such a classification, i. e., depending upon the prevalent location in the respiratory tract, would be more to the point and more desirable than classifications previously suggested.

All this is preliminary to the opinion that influenza is a disease of the respiratory system and that manifestation elsewhere, at the onset, during or following the infection, are evidence of the extreme severity of the attack, of definite complications, of sequelae or of intercurrent disease and not the evidence of the specific infection or pathology elsewhere.

In the recent epidemic every effort was made by the writer to find a case which might present the gastro-intestinal form of influenza. Among from five to six hundred cases in hospital practice under rather close observation and among a number of cases seen outside of the hospital, quite a few had gastro-intestinal manifestations which might have lead one to think at first that they were the chief and only symptoms, and that the infection and whatever pathology might be present was of the gastro-intestinal tract, but in none have we been able to show this to be the fact. In all, the respiratory lesion was sooner or later recognized. Reference will be made to only two cases, and these are typical of others which were equally instructive.

One was the case of a lad about twenty who had intense nausea and vomiting from the first, with no other symptoms but frontal headache and a conjuntivitis. He had a rather high temperature and the characteristically slow pulse. A diagnosis of influenza was made largely because of the prevalence of the epidemic. It was supposed to be of the gastro-intestinal type. An examination made by a competent nose and throat specialist revealed an ethmoiditis, with an accompanying conjunctivitis, complicating influenza. The relief of the pressure in the ethmoid promptly relieved the nausea and vomiting.

Another was the case of a man who was sent to the surgical department of the hospital with a high temperature and a rapid pulse, suffering from pain in the left side of the abdomen and with an obstinate hiccough. The left rectus was rigid, peristalsis diminished, and there was definite tenderness on deep percussion over the left lumbar muscle. A perforation with peritonitis, or some lesion in the left kidney or ureter, was suspected. The patient was referred to the medical department for diagnosis. In a few days definite evidence of pleurisy was found at the left base, later the complex and confusing signs of influenzal pneumonia were plainly present and the diagnosis of influenza established. The hiccough and rigidity of the abdominal muscles continued. It was supposed that there was a lesion below the diaphragm due to the influenzal infection. At the autopsy a purulent diaphragmatic pleurisy was found beneath the left lung. The lungs showed pathology characteristic of an influenzal pneumonia. The peritoneal surface and the abdominal organs were absolutely normal. Without an autopsy this case could easily have been passed, especially before the pleurisy was recognized, as one of influenza of the gastro-intestinal type.

Among our patients we had a number with symptoms referable to the stomach which

were characteristic of ulcer, or symptoms referable to the appendix; but in nearly all we could obtain a history of previous digestive disturbances. In these cases we concluded that an old lesion had been activated by the influenzal invasion. This was, of course, not peculiar to the gastro-intestinal tract in influenza. The pathology in other organs and systems was apparently similar. A striking symptom which must have been noted by all was that of the enlarged thyroids and potential hyperthyroidism. During or after the attack of influenza, the thyroid became acutely enlarged and in many cases symptoms of hyperthyroidism appeared. Such an instance would certainly not warrant the designation of a "thyroid form" of influenza. No doubt many such cases have been passed over thoughtlessly and the patients looked upon as manifesting the "nervous form" of influenza.

The autopsies done at the Mercy Hospital [Pittsburgh], where most of the clinical observations upon which this paper is based were made, did not reveal any characteristic pathology of the gastro-intestinal tract which could be attributed to the influenza invasion, unless one considers the slight hyperplasia of the solitary follicles, which was noted by Dr. A. J. Brecken, the assistant pathologist. Dr. Klotz, director of the Pathological Department of the School of Medicine, University of Pittsburgh, who has done a large number of most thorough autopsies in connection with the work at the Magee Hospital, where the soldiers were sent, reports no distinctive gastro-intestinal lesions. On the other hand, he reports, besides the lesions in the respiratory system, such lesions as multiple abscesses of the kidney, characteristic lesions of bones and joints and of the long muscles of the body. Dr. H. H. Permar, Major R. C., Base Hospital No. 27, from the University of Pittsburgh, has reported to the writer personally that in one hundred and twenty consecutive autopsies in influenza cases, no specific pathology was found in the gastro-intestinal tract.

From the clinical and pathological standpoint, accordingly, we feel there is not sufficient data to warrant the designation of a "gastro-intestinal form" of influenza. We are aware that many cases are being reported as of this type and the question may be asked, "What is the explanation of this abundant evidence?" It must not be forgotten that the incidence of influenza in some communities was as high as 40 per cent., and also that a lowering of physical reserve would naturally favor the progress of intercurrent disease in any organ. It should not be difficult, therefore, to find a half dozen cases of appendicitis or as many more cases of acute exacerbation of a latent peptic ulcer in any community among the 40 per cent. stricken.

It is the opinion of the writer, therefore, that the symptoms of the so-called gastro-intestinal form of influenza can all be explained by the well-known intoxications which may be associated with an acute infection, or by previously existing pathology of the gastro-intestinal tract, or by the occasional transference of symptoms to organs below the diaphragm from pathology immediately above the diaphragm, or by the mere incidence of the usual diseases of the gastro-intestinal tract in such a widespread epidemic.

The gastro-intestinal manifestations of influenza in this epidemic, and possibly in past epidemics, whether they occurred during the attack or afterwards, are complications or sequelæ and are not evidence of a distinct form of influenza.

THE PATIENT'S REACTION

A NEGLECTED BUT IMPORTANT PHASE IN THE STUDY OF MEDICINE

BY F. M. POTTENGER, A.M., M.D., LL.D., F.A.C.P.

Professor of Diseases of Chest, University of Southern California School of Medicine

Monravio, Calif.

DESPITE all our knowledge of the changes in body tissues made possible by the development of pathological anatomy, and our knowledge of microorganisms and their relation to disease furnished by the study of bacteriology, parasitology and immunology, and the great mass of facts which have been revealed by the development of biochemistry; despite all information gained by means of such measures as tracings, blood-pressure records, *x*-ray pictures, and the knowledge possible from animal experimentation; despite all of this, if one would know medicine he must study the patient and the manner of his reactions. While this phase of disease has not received as much attention in the scheme of study pursued in modern medicine as those which pertain to the disease itself, yet it is no less important.

Man is placed in this world with two important relationships to maintain: one, with the physical forces which surround him; the other, with the less definite, less understood, but no less real, psychical forces which operate about him. Unfortunately, medical men, outside of a comparatively small group, have not recognized the importance of earnestly studying man's reactions as a part of the field of medicine. While tremendous effort has been put forth to determine the character of disease-producing agencies, and the pathological changes of an anatomic and chemical nature wrought by them, but feeble efforts have been made to determine the manner in which, and the agencies through which, these reactions are produced—that is, how the being, physical and psychical, reacts toward the disease producers. This field of medicine now demands the same earnest consideration as those phases which have received our attention in the past.

One of the great problems in medicine today is to correlate the physical, psychical, nervous and endocrine manifestations of disease; to determine not only what changes take place in the physical body as a result of the disease, but to study through what agencies these manifestations are produced and also the manner in which they react upon the psychical side of the patient; and in turn, the manner in which the psychical state of the patient affects the physical through the vegetative nerves and endocrine glands.

As far as we know, there are two main agencies through which symptoms of disease may be produced: the nerves and the chemical products of the endocrine glands. All acts of the human body which are essential to life, such as the circulation of blood, respiration, digestion, and metabolic processes, are controlled by the vegetative nerves and the products of the endocrine glands. These, in turn, are influenced by physical surroundings and psychical states.

Factors which produce disease processes may operate either from without or from within the body. If from without, the harmful stimuli are carried centralward to the cord and brain through the spinal and cranial sensory nerves. When they reach the brain and cord they are either transferred to other neurons of an efferent type, and then produce symptoms of a reflex nature; they

are transferred to other neurons which carry the impulses to higher centers before nerve action results; or, a psychical reaction may be precipitated which is discharged through certain divisions of the nervous system as a whole. Various endocrine glands may also be stimulated to action, either reflexly, or as a result of psychical reaction. It is thus that outside stimuli produce symptoms of disease. Reactions may take place and symptoms result either with or without affecting the cortical nerve centers, and, either with or without calling psychical reactions into play.

If the disease-producing factors arise within the body, such as is the case in infectious diseases and in diseases arising from harmful products which are formed within, then the course, while partly the same, varies as will now be apparent. Such disease-producing factors may stimulate sensory visceral nerves, which carry the stimuli centralward and transfer the impulses to efferent neurons causing reflexes, or, to other neurons which carry them to higher centers, in much the same manner as the sensory spinal and cranial nerves do when the disease-producing factors arise without the body. Here too, cortical centers may or may not be involved, and psychical reactions may or may not ensue. Again, the disease-producing factors may be of a chemical nature, and circulate in the body, acting upon nerve cells, or possibly directly upon peripheral structures. The endocrine glands, too, stand in such a relationship that they may be called into action by such disease-producing factors either reflexly through the nerves, through the action of deleterious chemical substances, through the action of the hormones produced by other endocrine organs, or through discharge of psychical force.

Symptoms of disease also may originate from psychical instead of physical reactions and be discharged through the nerves and endocrine glands. It is just as important to recognize this pathological physiology, based on psychical reactions, as it is to recognize that based on physical reactions.

Thus we see that a disease process acting upon the physical body may cause physical derangement in certain other organs or tissues, in the body as a whole, or it may upset the normal psychical equilibrium. On the other hand, disease-producing forces may originate as psychical reactions and, acting through the nerves and endocrine glands, cause a complete upsetting of the physical organism.

Throughout the skeletal muscles we have one muscle or group of muscles opposed by another group of muscles, activated by the voluntary nervous system and under the control of the will. In the vegetative structures we have smooth muscles and secreting glands which are supplied by one set of nerves only, the action depending upon the degree and character of the stimulation, as seen in the control of the blood-vessels by the sympathetic nervous system; or, muscles and secreting glands activated by one division of the vegetative system and inhibited by the other, as is seen throughout the endocrine system where the parasympathetics cause contraction of muscle and glandular secretion and the sympathetics relax the muscle and inhibit glandular secretion.

Of the endocrine glands we have some that are stimulated by the sympathetics, such as the adrenal, thyroid and pituitary; others stimulated by the parasympathetics, such as the pancreas, ovaries and testicles. The products of these glands in turn stimulate or oppose each other. The adrenals, thyroid and pituitary all stimulate each other and inhibit action in the pancreas and gonads, while the latter both seem to oppose the adrenals, thyroid and pituitary.

In psychical reactions we have the same antagonism shown. Pleasing emotions, such as joy and happiness, are accompanied by harmonious action of the endocrine glands and vegetative nervous system; while such harmful emotions as fear, anger, discomfort, sorrow and pain destroy the equilibrium in both of these systems and upset the harmonious workings of vegetative structures.

The study of these reactions lies in the province of normal and pathological physiology.

While we should continue our studies in pathological anatomy, bacteriology, serology, and biochemistry if we would make our medical study complete, we also should study with equal zeal the normal and pathological nerve, endocrine and psychical reactions.

It is necessary then to study, analyze and correlate the various physical and psychical reactions which we meet in clinical practice if we would practice medicine intelligently. To this end more attention should be paid to the study of:

1. The vegetative nervous system.
2. The endocrine glands.
3. The physical reactions and their relationship to psychical states.
4. The psychical reactions and their relationship to physical states.

WASSERMANN REACTION WITH GLYCEROLATED HUMAN SERUM ABOUT TWO YEARS OLD*

BY E. H. REUDIGER, A.B., M.D., F.A.C.P.

From the Pathological Laboratory of the Bismarck Hospital
BISMARCK, N. D.

AS the preservation of human serum plays a very important rôle in standardizing the Wassermann reaction a great deal of investigation is necessary on this point.

In a previous report * it was shown that human serum mixed with an equal volume of glycerol kept well for at least one year. The same serums were reported † on a year later, but most of the serums had spoiled because the containers had not been properly sealed. The serums to be reported on at this time were sealed in 2.5 c. c. glass ampules to guard against evaporation.

The Wassermann technic with a human hemolytic system was used in this work.

The syphilitic human serums to be tested were pipetted off the clots, heated to about 56° C. for thirty minutes and, after cooling, were mixed with equal volumes of sterilized glycerol. Each serum was subjected to a quantitative Wassermann test and was diluted with a 50 per cent. solution of glycerol to such an extent that the diluted serum gave no less than 3+ nor more than 8+.

All serums in this series were such that they had to be diluted to at least 1:100. Serums of which lower dilutions than 1:100 had to be used in order to get at least 3+ were excluded. After having been properly diluted, the serums were put into glass ampules and the latter were hermetically sealed in a flame. These were then kept in a dark place at room temperature. The serums from non-syphilitic persons were heated, mixed with an equal volume of glycerol, and this mixture was sealed in glass ampules and kept in a dark place at room temperature.

Six test-tubes, designated as 1, 2, 3, 1′, 2′ and 3′ were used for each test. Each tube received 0.2 c. c. of the serum-glycerol mixture. Tubes 1 and 1′ received 0.2 c. c. of 1:5 dilution of complement serum. Tubes 2 and 2′ received 0.2 c. c. of 1:10 dilution of complement serum and Tubes 3 and 3′ received 0.2 c. c. of 1:20 dilution of complement serum. Antigen, hemolytic amboceptor and corpuscle suspension were diluted so that 0.2 c. c. contained the test dose. Each tube received a total quantity of 1 c. c. Tubes 1, 2 and 3 were antigen tubes and Tubes 1′ 2′ and 3′ were the corresponding control tubes.

As complement serum, the pooled serums of three guinea pigs were used in dilutions of 1:5, 1:10 and 1:20.

* Jour. Infect. Dis., 1917, xxi, 502.
† Jour. Infect. Dis., 1918, xxiii, 351.

The antigen used was plain alcoholic extract of syphilitic human heart-muscle, in a dilution of 1:100, which appeared to be the optimum dilution for this particular lot of antigen.

As hemolytic amboceptor, the serum of a rabbit immunized with washed human blood-corpuscles was used in quantities which gave incomplete hemolysis in the last control tube, Tube 3′, titration being in the presence of 0.2 c. c. of 50 per cent. solution of glycerol which corresponds to the 0.2 c. c. of serum-glycerol mixture used in the test.

Human blood-corpuscles were well washed and were used in amounts of 0.2 c. c. of a 2.5 per cent (1:40) suspension in 0.9 per cent. solution of sodium chlorid.

Incubation was carried on in a water-bath at 1° C. for five hours, and thirty minutes in the incubator at 37° C. before the sensitized blood-corpuscles were added. After the sensitized blood-corpuscles had been added the tubes were kept in the incubator at 37° C. for one hour, during which time they were well shaken at intervals of fifteen minutes. After leaving the tubes another hour in the incubator, to allow the undissolved blood-corpuscles to settle, the results were read and recorded.

In reading and recording the results, a difference of less than 50 per cent. of one tube is called 1+; a difference of between 50 per cent. and 100 per cent. of one tube is called 2+; a difference of one complete tube is called 3+, etc.

Example:

Antigen Tubes			Control Tubes				Results	
+	+	trace	+	+	±	=	1	+
+	+	○	+	+	±	=	2	+
+	±	○	+	+	±	=	3	+
+	trace	○	+	+	±	=	4	+
+	○	○	+	+	±	=	5	+
±	○	○	+	+	±	=	6	+
trace	○	○	+	+	±	=	8	+
○	○	○	+	+	±	=	10	+

Test 1

Ten serums (Numbers 1 to 10 inclusive) were obtained from patients known to be syphilitic. Each serum was heated to about 56° C. for thirty minutes, mixed with an equal volume of glycerol and subjected to a quantitative Wassermann test. Only such serums were used as gave at least 3+ in a dilution of 1:100. After the proper dilution had been determined the serums were diluted and were put up in hermetically sealed glass ampules. A record was kept of the results obtained with the fresh serums in 1917-1918, and in February, 1920, the serums were again tested, with and without being reheated.

Table I shows the results obtained with the ten syphilitic human serums. They had become but slightly anticomplementary and the results obtained with the Wassermann reaction in February, 1920, are almost identical with those obtained in 1917-1918. All serums had remained perfectly clear and sterile.

TABLE I

GLYCEROLATED SYPHILITIC HUMAN SERUMS ABOUT TWO YEARS OLD

No. Of Serum	Secured	Heated	Reheated	Tested	Readings*						Results	
					Antigen Tubes			Control Tubes				
					1	2	3	1′	2′	3′		
1.	Nov., 1917	Nov., 1917		Nov., 1917	+	±	○	+	+	±	3	+
	Nov., 1917	Nov., 1917		Feb., 1920	+	±	○	+	+	±	3	+
	Nov., 1917	Nov., 1917	Feb., 1920	Feb., 1920	+	±	○	+	+	±	3	+
2.	Jan., 1918	Jan., 1918		Jan., 1918	+	○	○	+	+	±	5	+
	Jan., 1918	Jan., 1918		Feb., 1920	+	tr	○	+	+	±	4	+
	Jan., 1918	Jan., 1918	Feb., 1920	Feb., 1920	+	tr	○	+	+	±	4	+
3.	Mar., 1918	Mar., 1918		Mar., 1918	+	○	○	+	+	±	5	+
	Mar., 1918	Mar., 1918		Feb., 1920	+	○	○	+	+	±	5	+
	Mar., 1918	Mar., 1918	Feb., 1920	Feb., 1920	+	○	○	+	+	±	5	+
4.	Mar., 1918	Mar., 1918		Mar., 1918	+	tr	○	+	+	±	4	+
	Mar., 1918	Mar., 1918		Feb., 1920	+	±	○	+	+	±	3	+
	Mar., 1918	Mar., 1918	Feb., 1920	Feb., 1920	+	±	○	+	+	±	3	+
5.	Mar., 1918	Mar., 1918		Mar., 1918	±	○	○	+	+	±	6	+
	Mar., 1918	Mar., 1918		Feb., 1920	±	○	○	+	+	tr	5	+
	Mar., 1918	Mar., 1918	Feb., 1920	Feb., 1920	+	○	○	+	+	±	5	+
6.	Mar., 1918	Mar., 1918		Mar., 1918	±	○	○	+	+	±	6	+
	Mar., 1918	Mar., 1918		Feb., 1920	±	○	○	+	+	tr	5	+
	Mar., 1918	Mar., 1918	Feb., 1920	Feb., 1920	+	○	○	+	+	±	5	+
7.	Apr., 1918	Apr., 1918		Apr., 1918	+	tr	○	+	+	±	4	+
	Apr., 1918	Apr., 1918		Feb., 1920	+	○	○	+	+	±	5	+
	Apr., 1918	Apr., 1918	Feb., 1920	Feb., 1920	+	○	○	+	+	±	5	+
8.	Apr., 1918	Apr., 1918		Apr., 1918	tr	○	○	+	+	±	8	+
	Apr., 1918	Apr., 1918		Feb., 1920	tr	○	○	+	+	±	8	+
	Apr., 1918	Apr., 1918	Feb., 1920	Feb., 1920	tr	○	○	+	+	±	8	+
9.	May, 1918	May, 1918		May, 1918	+	tr	○	+	+	±	4	+
	May, 1918	May, 1918		Feb., 1920	+	○	○	+	+	tr	4	+
	May, 1918	May, 1918	Feb., 1920	Feb., 1920	+	○	○	+	+	±	5	+
10.	Aug., 1918	Aug., 1918		Aug., 1918	+	tr	○	+	+	±	4	+
	Aug., 1918	Aug., 1918		Feb., 1920	+	○	○	+	+	tr	4	+
	Aug., 1918	Aug., 1918	Feb., 1920	Feb., 1920	+	tr	○	+	+	±	4	+

*Explanation: + = complete hemolysis; ± = hemolysis between 50% and 100%; tr (trace) = hemolysis up to 50%; ○ = no hemolysis.

Test 2

Serums—Numbers 11 to 15 inclusive—were obtained from non-syphilitic patients. Each serum was heated to about 56° C. for thirty minutes, after which it was mixed with an equal volume of sterilized glycerol. They were then put into glass ampules and the latter were hermetically sealed in a flame, following which they were kept in a dark place at room temperature. In January, 1918, each of these serums gave a negative result with the Wassermann reaction and in February, 1920, they were again tested, with and without being reheated.

The results obtained with the five serums from non-syphilitic persons are shown in Table II. The results obtained in February, 1920, were identical with those obtained in January, 1918. These serums had become but slightly anticomplementary and the anticomplementary property was almost completely destroyed by reheating the serum to 56° C. for thirty minutes.

Table II

Glycerolated Non-syphilitic Human Serums About Two Years Old

No. Of Serum	Secured	Heated	Reheated	Tested	Readings*						Results
					Antigen Tubes			Control Tubes			
					1	2	3	1′	2′	3′	
11.	Jan., 1918	Jan., 1918		Jan., 1918	+	+	±	+	+	±	Negative
	Jan., 1918	Jan., 1918		Feb.. 1920	+	+	○	+	+	○	Negative
	Jan., 1918	Jan., 1918	Feb., 1920	Feb., 1920	+	+	±	+	+	±	Negative
12.	Jan., 1918	Jan., 1918		Jan., 1918	+	+	±	+	+	±	Negative
	Jan., 1918	Jan., 1918		Feb., 1920	+	±	○	+	±	○	Negative
	Jan., 1918	Jan., 1918	Feb., 1920	Feb., 1920	+	+	±	+	+	±	Negative
13.	Jan., 1918	Jan., 1918		Jan., 1918	+	+	±	+	+	±	Negative
	Jan., 1918	Jan., 1918		Feb., 1920	+	+	tr	+	+	tr	Negative
	Jan., 1918	Jan., 1918	Feb., 1920	Feb., 1920	+	+	±	+	+	±	Negative
14.	Jan., 1918	Jan., 1918		Jan., 1918	+	+	±	+	+	±	Negative
	Jan., 1918	Jan., 1918		Feb., 1920	+	±	○	+	±	○	Negative
	Jan., 1918	Jan., 1918	Feb., 1920	Feb., 1920	+	+	±	+	+	±	Negative
15.	Jan., 1918	Jan., 1918		Jan., 1918	+	+	±	+	+	±	Negative
	Jan., 1918	Jan., 1918		Feb., 1920	+	±	○	+	±	○	Negative
	Jan., 1918	Jan., 1918	Feb., 1920	Feb., 1920	+	+	tr	+	+	tr	Negative

*Explanation: + = complete hemolysis; ± = hemolysis between 50 %and 100%; tr (trace) = hemolysis up to 50%; ○ = no hemolysis.

Summary

Fifteen glycerolated human serums were kept in hermetically sealed glass ampules in a dark place at room temperature for about two years, after which time they were as suitable for the Wassermann reaction as they were when fresh.

The results obtained with the syphilitic serums two years old were not quite identical with the results given by the same serums while fresh. In some instances the fresh ser-

ums gave stronger positive results than did the old serums; in other instances the old serums gave stronger positive results than did these same serums two years previously. Such or even greater differences than those recorded here may be due to technical variations, differences in complement or in antigen, or to differences in the proportions of various ingredients employed, and may be expected no matter how efficient may be the technic employed.

The non-syphilitic serums gave uniformly negative results. In two years' time these serums had become but slightly anticomplementary and reheating the serums to 56° C. for thirty minutes removed the anticomplementary property without noticably affecting the result given by the Wassermann reaction. All serums remained perfectly clear and sterile.

EARLY SIGNS OF FIBRILLATION OF THE VENTRICLE AS SHOWN BY THE OCCURRENCE IN THE ELECTROCARDIOGRAM OF PERIODS OF VENTRICULAR TACHYCARDIA

BY LOUIS FAUGERES BISHOP, A.M., M.D., D.Sc., F.A.C.P.

Clinical Professor of Heart and Circulatory Diseases, Fordham University School of Medicine, Physician to Lincoln Hospital

New York

THE author has at present under his care two patients who show instances of that rather unusual condition called ventricular tachycardia. This very rapid action of the ventricles is closely related to fibrillation of the ventricles, just as the very rapid action of the auricles in auricular tachycardia is closely related to fibrillation of the auricles.

Fibrillation of the auricles is not of great importance to the circulation as a whole, for the auricles do not do much to drive the blood along: but if the muscle of the ventricles should fibrillate, then there would be no rhythmic systoles of the ventricles, and the heart would no longer force blood into the arteries. Fibrillation of the ventricles then will mean death and it is very likely that many cases of sudden death are due to this cause.

CASE I

Mr. L. I. B. S., a young man twenty-three years of age, was subject to attacks of severe palpitation, which came on at irregular intervals and which never seemed to have any definite exciting cause. He was in the army for ten months, during which time he had rheumatic fever. After this he had attacks of palpitation at two different periods and was discharged from the service for this reason. Since his discharge he has been having tachycardia frequently. The attacks are accompanied by a feeling of great prostration.

Figure 1 is the electrocardiogram of this patient taken during the interval between attacks. This record is irregular, due to the occurrence of premature beats, which start in the auricles. The ventricular waves are normal enough, except that they show predominance of the left ventricle.

Figure 2 is the electrocardiogram obtained during one of the attacks. It is a typical instance of the curve produced by a tachycardia arising in the muscle of one of the ventricles. We cannot see any waves due to the auricle but the waves marked 1 and F follow close after each other and taken together produce a wave such as is caused by a premature beat starting in one ventricle. (See the section between the verticle lines in the figure). Each

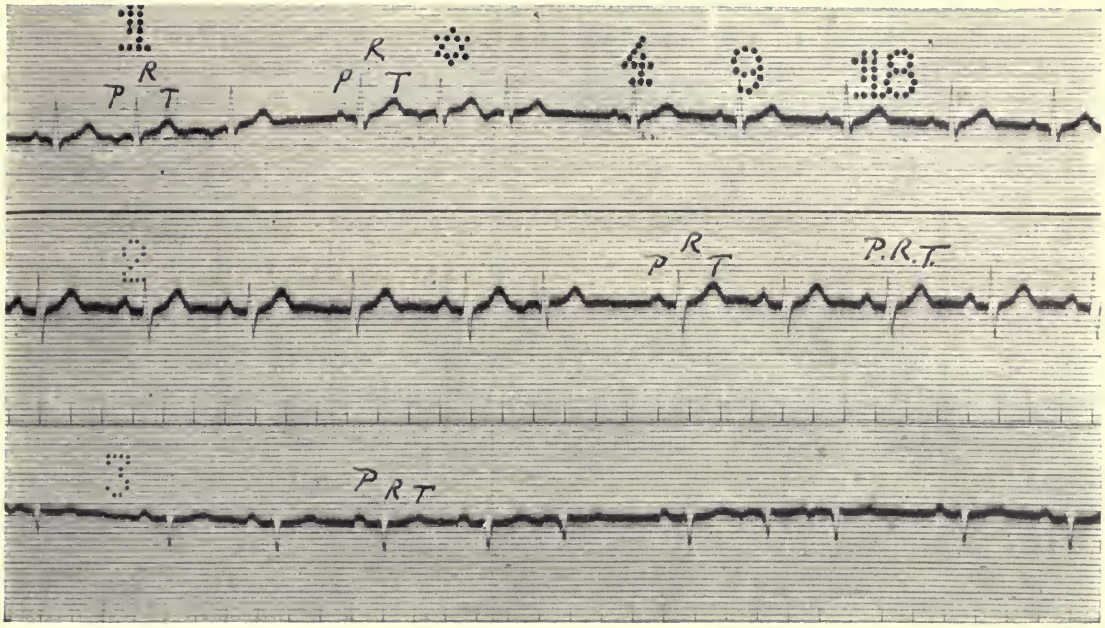


FIG. 1.—ELECTROCARDIOGRAM IN CASE OF VENTRICULAR TACHYCARDIA . (CASE OF L. I. B. S.)
Between attacks of ventricular tachycardia, but showing premature beats starting in the inside.

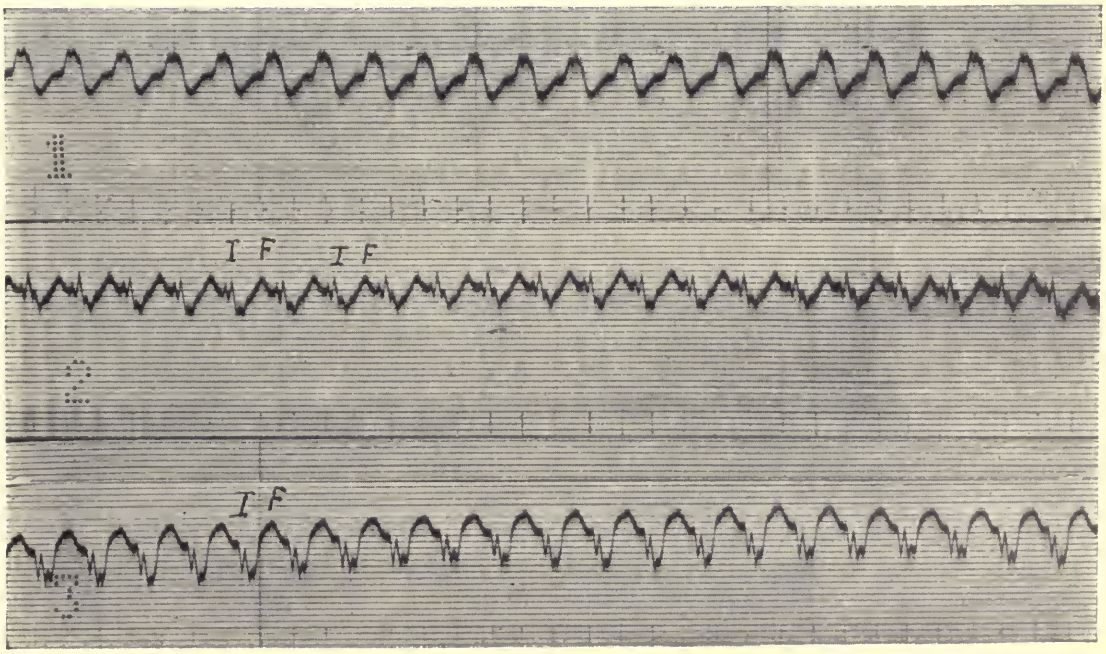


FIG. 2.—ELECTROCARDIOGRAM IN CASE OF VENTRICULAR TACHYCARDIA. (CASE OF L. I. B. S.)

systole then is a premature beat starting in the ventricle itself and the record is made up of a rapid succession of these premature beats. The rate is about 200 per minute. With this patient, the attacks lasted for a considerable time—perhaps for several hours—and were very exhausting to him. Such attacks do not always last so long.

he was referred to the author by Doctor Frank H. Whittemore, of New Haven.

The details of the history and examination are such as would correspond with the usual example of angina in a man of this type.

The object of this paper is to call attention to this rare and possibly early indication of a condition which might lead to sud-

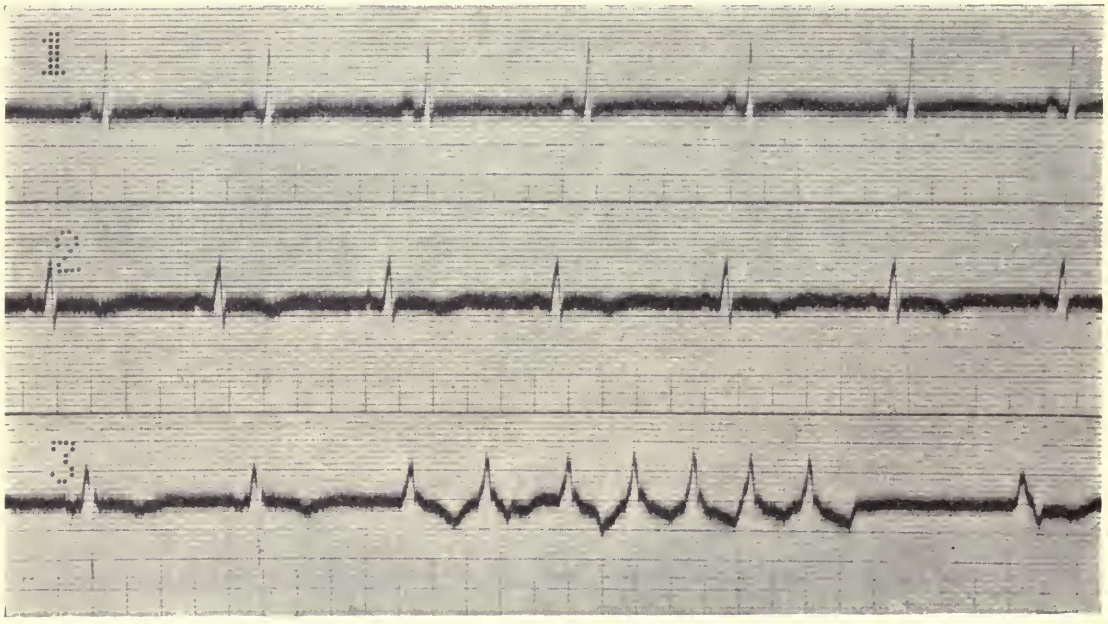


Fig. 3.—Ventricular Tachycardia of Short Duration. (Case of F. D. B. M.)

CASE II

In lead 3 of Figure 3 is seen one which lasted for only seven beats. With this patient, Mr. F. D. B. M., the attacks were much shorter. He complained of very severe cardiac symptoms, having typical anginal attacks. He was sixty years of age and the captain of a towboat navigating the Atlantic Coast. He was taken with an attack of angina while his ship was passing New Haven, and was taken ashore to a hospital there. When he recovered from his attack

den death. Thus far, both of the patients mentioned are alive.

The ventricular tachycardia which these patients have shown is a serious influence toward causing sudden heart-failure. The rapid rate may tire out the heart if it continues for a long time or the tachycardia may lead to fibrillation of the ventricles, with sudden death, as has been pointed out. The cause is found to be a disease process of the ventricular muscle, perhaps due to rheumatism, or some other degenerative influence.

PSEUDOCHYLOUS ASCITES IN A CASE OF SYPHILITIC NEPHRITIS*

BY E. L. TUOHY, A.B., M.D., F.A.C.P.

Chief Medical Consultant at the Duluth Clinic

DULUTH, MINN.

Milky transudates in the peritoneal cavity are of three general varieties: (1) the chylous; (2) the so-called chyliform; (3) the pseudochylous.

The *chylous* form rises from pathological conditions in the lymphatic duct of the receptaculum chyli. The high sugar content of the fluid is about .200 and fat is easily demonstrable.

The *chyliform* variety is described as occasionally occurring in peritoneal inflammations and in abdominal neoplasms, notably of ovarian origin. Fat is found in small globules visible under the microscope. The ailment is seemingly due to fat formed by cellular disintegration in contradistinction to the chylous variety.

The name *pseudochylous ascites* has been applied to the type of fluid under discussion, because of similar appearance; yet it is peculiar in the absence of sugar and fat. The milky color is thought to be due in this instance to the presence of pseudoglobulin and lecithin held in solution by the presence of inorganic salts. In dialyzing the salts out of the fluid, the lecithin and globulin are precipitated, leaving the supernatant fluid clear. This condition is interesting on account of its rarity. Only a few cases have been reported and these, chiefly by English observers. This anomaly has occurred only in chronic parenchymatous nephritis and strikingly enough, there has usually been the association of secondary syphilis.

CASE REPORT

The patient under consideration is a male, 52 years of age.

PAST HISTORY.—Negative. Denied syphilis or alcoholism. Has healthy family of five children.

PRESENT COMPLAINT.—Symptoms began with swelling of ankles about November 1, 1919. Patient had some dyspnea on exertion, and complained of developing weakness. His attending physician diagnosed the case as Bright's disease; he was tapped on two occasions. When he came under our observation on December 13th, we found a man of unusual vigor confined to his bed, complaining of no definite symptoms except shortness of breath and a tendency to nausea, having a short hacking cough. Patient was greatly worried and had been unable to sleep.

PHYSICAL FINDINGS.—He had a full plethoric appearance; tongue very red and dry; no cyanosis of lips or fingers. In the beginning his temperature was normal, pulse ranged from 80 to 120; heart sounds were rather muffled but of good rhythm. The blood-pressure in the beginning showed 90 diastolic and 130 systolic; it never mounted any higher. The lung sounds in both bases were poorly transmitted, but no rales were detected. The abdomen showed the sites of two previous punctures which were not yet entirely healed; free fluid was easily made out in the peritoneal cavity; there was moderate distention. The legs were markedly edematous up to and above the knees. Scrotal edema was present from time to time.

BLOOD EXAMINATION.—The blood picture showed red blood-cells, 5,110,009; hemoglobin, 95 per cent.; leukocytes, 9,400; differential count, normal (this despite the fact that he had been sick at that time approximately

* From the Duluth Clinic.

six weeks); the blood Wassermann was reported positive (complete inhibition on December 24th).

Urine Examination.—The urine examination in the beginning showed innumerable granular and hyaline casts; a very few leukocytes and red blood-cells; copious albumin (1.1 Esbach), sugar absent. From time to time the amount of albumin and the number of tube casts varied, but never changed decisively. The output of urine ranged from day to day from 600 c. c. to 4 or 5 liters; the variation depended upon his general condition, his diet and fluid intake. The output at times seemed to be influenced by medication. When the urinary output rose quite rapidly the dependent edema decreased, but the degree of ascites did not seem to change greatly. The blood sugar and creatinin were within normal limits—.09 per cent. and 1.4 milligrams in 100 c. c. of blood. Phenolsulphonephthalein test showed on two occasions 15 in the first hour and 25 in the second. (Total, 40—reduced about 50 per cent.)

Treatment.—In the beginning, patient was considered an ordinary case of parenchymatous (wet) nephritis and was treated accordingly, by abstinence from salt and with a low protein diet and fluid intake. He had previously been vigorously sweated and this treatment was given with caution. After the Wassermann was reported positive he was watchfully given mercury by hypodermatic injection but it was only given for a few days. Patient began soon thereafter to show signs of delirium and incoherence.

For twenty-four hours before his death, which occurred on January 17, 1920, he showed decided evidences of acute obstruction of the bowels. For the first time he developed a temperature. It went as high as 103° F. There was much distention of the bowels and only the lower colon could be emptied. The leukocyte count rose to 11,400. Rapid prostration followed and death occurred. Any surgical intervention of the abdominal condition was deemed unwise. It was thought at the time that possibly some obstruction might have taken place involving the coils of the small intestine. At any event it appeared that we had to deal with an acute abdominal condition as a terminal affair, although, previously there had been no tenderness to the ordinary manipulation or other indications of an inflammatory state.

Autopsy Findings.—The abdomen contained about 8 liters of milky, turbid fluid; the surface of the peritoneum and bowels was smooth, moist and shiny, with no evidences of adhesions or signs of obstruction; the bowel was uniformly collapsed. There were a few calcareous, sand-like particles in the head of the pancreas but no evidence of hemorrhage or inflammatory reaction. In each pleural cavity there was about one liter of the same pseudochylous fluid as that found in the abdomen; there were no pleural attachments or adhesions; the lungs were negative.

The pericardial sac contained only the normal amount of clear serum, there was no evidence of recent or old inflammation; the heart showed no hypertrophy; the intima of the aorta showed a few yellowish plaques characteristic of intimal sclerosis; cardiac valves were intact; the heart muscle appeared normal. The *spleen* was normal in size and consistency; normal markings on cross-section.

Kidneys.—The kidneys were described as normal-sized or possibly showing slight enlargement; the capsule was glistening and stripped freely, leaving no surface irregularities; there was a normal relationship of cortex to the medulla; the cortex was pale, slightly tinged with yellow; normal markings were fairly well made out in the medulla, and the blood-vessels were apparent; the whole organ was softer than normal and indicative of an acute parenchymatous nephritis.

Microscopically, the glomeruli showed average frequency and unifority in size; no overgrowth of connective tissue or cellular infiltration. The endothelial cells showed some hyaline changes.

The convoluted tubules showed the greatest change: The cells in different areas studied showed various stages of degeneration: cloudy swelling, granular and hyaline changes. Only a slight degree of connective-tissue overgrowth was seen between the tubules, and this only occasionally and particularly in the medulla and deeper portions of the cortex; the cells between the convoluted and collecting tubules were widely separated by edema. There was no evidence of hemorrhage.

The Pseudochylous Fluid.—The pseudochylous fluid was a delicate pink color when held up to bright daylight and, on standing greenish flakes settled toward the bottom. It had no odor. On shaking, the supernatant foam was distinctly yellow. The material did not reduce Fehling's or Haines' solutions. On heating with nitric acid, a dense coagulum formed, characteristic of albumin. The specific gravity was 1008. On centrifuging at high speed the fluid did not seem to clarify particularly, but sediment showed numerous cellular elements under the microscope. No fat could be identified even when especially stained for fat. There were numerous polymorphonuclear leukocytes; some small round cells—probably plasma cells—and the usual epithelial debris. Smears showed a few short chains of streptococci. The pseudochylous fluid gave a positive Wassermann in 1 c. c. amount; this was read according to the older terminology as a 3+ reaction. In treating the fluid with ether three distinct layers appeared: (1) a clear ether layer; (2) a denser cloudy zone; (3) a comparatively clearer deepest layer.

DISCUSSION

This rare condition has been thoroughly described by F. Park Webber*. His case is markedly similar in many respects to the instance here reported. We cannot be so definite as to the stage of syphilis present. The patient was a "cruiser" and much of the time away from home. Salvarsan should have been tried intravenously and might have yielded some results.

Our case is put on record primarily on account of the character of the ascitic fluid. Finding such in the presence of a nephritis, from the cases previously recorded, as well as this one, one should have in mind the possibility of syphilis. The particular features which should be emphasized are:

1. In the urine the extraordinary number of tube casts found and the high content of albumin.
2. The unusually high blood count.
3. The absence of cardiac hypertrophy or increase in blood-pressure.
4. The finding of low blood sugar and creatinin and a fair phenolsulphonephthalein output usually suggestive of a fair prognosis.
5. Picture otherwise of a "wet nephritis".
6. Finding of pseudochylous transudate.
7. The association of syphilis.
8. The apparent inflammatory reaction, intra-abdominal, during the last few hours of his life could have been a hematogenous infection. In the presence of ascitic fluid one would not expect the ordinary local reactions. It seemed to be simply a terminal condition.

* International Clinics, Series 26.

AN ENDOTHELIAL LEUKOCYTOSIS IN GUINEA PIGS BY INJECTION OF NON-PATHOGENIC BACILLI OF THE ACID-FAST GROUP

BY F. A. McJUNKIN, A.B., M.D., F.A.C.P.

Professor of Pathology, Marquette University School of Medicine

Milwaukee, Wis.

THE question of the entrance into the peripheral blood of cells of endothelial origin has been dealt with by the author in earlier writings [1, 2, 3]. Experimental evidence has recently been brought forth by Foot [4] to show that the common phagocytic cell (macrophage) of the tissues is an endothelial derivative. The theory that this phagocytic mononuclear cell of the blood and tissues arises by mitosis of blood-vessel and lymphatic endothelium was in advance of any experimental proof made reasonably certain by the histologic studies of Mallory [5] on human tissue.

The chief difficulty encountered in the determination of the effect on the blood of injections of bacteria and other substances was at first due largely to an inability to get all of the endothelial leukocytes to ingest carbon in the phagocytic experiments; also the technic was laborious. A remedy for this was found in the "benzidin-polychrome stain" which renders the enumeration of these leukocytes rapid and exact [6]. The fact that the cells stained by this method are the same as the mononuclear cells ingesting carbon has been repeatedly checked up by phagocytic experiments [7].

Since the total number of other cells in the blood could be increased by experimental injections of bacteria, cultures of *Bacillus typhosus*—an organism producing an endothelial reaction in human tissue [5]—was injected into guinea pigs and rabbits, but no increase in the blood of endothelial leukocytes was observed. Failure likewise followed injections of *Bacillus subtilis*. Attention was then turned to Sudan III which is known to produce local cell proliferations. With this substance a moderate endothelial leukocytosis may be produced but only by the administration of very large doses, and these soon cause the death of the animals [8]. When the dye was given with the food and in smaller amounts intraperitoneally or subcutaneously no effect was noted.

During these experiments guinea pigs receiving Sudan III were inoculated with *Bacillus tuberculosis,* and it was found that not only these, but the controls which had received no dye, developed endothelial leukocytoses higher than any observed in any of the animals receiving the dye alone. This suggested injections of nonpathogenic bacilli of the acid-fast group. Two of these (*Bacillus smegmæ and Bacillus phlei*) have been used, and in both cases increases greater than those secured with Sudan II have been produced, the injury to the animals being much less.

With the endothelial leukocyte as the reacting cell in such infections as tuberculosis, typhoid fever and leprosy, the implied practical importance of developing a method for producing a reaction on the part of the endothelial leukocytes is manifest, provided the measures employed do not cause profound injury to the animals. That a cell of endothelial origin is the first—and often the only one—to react in human [5] and animal tissue [9] in the formation of tubercles seems certain and, since this cell ingests tubercle bacilli, it appears not improbable that under certain conditions these intracellular bacilli are destroy-

ed by the phagocytes. The well-known fact that macrophages are active in the intraperitoneal reaction produced by the injection of tubercle bacilli into the peritoneal cavity of tuberculous guinea pigs lends support to this view. If such is the case, it is not unreasonable to suppose that a reaction characterized by an increase of endothelial leukocytes might tend to raise any natural resistance against the infection. The possible importance of the endothelial leukocyte in resistance to tuberculous infection has been very largely discredited or overlooked by workers on experimental tuberculosis.

Observations on the first laboratory animals examined revealed the comparatively small number of endothelial leukocytes present in the blood of normal guinea pigs, rabbits and dogs in comparison with the number found in the normal adult human. The fact that Warfield [10] found as many as 46 per cent. of these leukocytes in the blood of typhoid fever patients indicates that infections characterized by an endothelial leukocytic reaction in the tissues cause a percentage of the reacting cells to appear in the blood stream that is much higher than the ones so far produced in experimental animals. In short, one would expect that it would be more or less difficult to call forth this reaction in the ordinary laboratory animals available. However, one may, with either of the acid-fast organisms referred to, produce a striking endothelial leukocytosis lasting for a number of weeks without profound injury to the animals receiving the injections.

SCOPE OF WORK

In all, thirty-six guinea pigs have received injections: twenty-two with *Bacillus smegmæ* and fourteen with *Bacillus phlei*. Both organisms are old stock cultures which grow rapidly and abundantly on glycerin agar. With the idea that a much wider distribution of organisms to the endothelial cells could be accomplished by intravenous injection, the method for ear-vein injections of guinea pigs described by Rous [11] was used at the beginning. However, an early intraperitoneal injection showed that the same leukocytic reaction could in this way be secured, and later all injections were made intraperitoneally.

Guinea pig 81, weighing 800 grams, with a normal count of 1.1 per cent. of endothelial leukocytes, received into the ear-vein 1 c. c. of a very heavy suspension of live smegma bacilli. Three days later the count was 10 per cent. The total leukocytes per cubic millimeter from 19,000 to 29,700. In the differential enumeration of the leukocytes of this and all other animals more than 500 cells were enumerated.

Guinea pig 85, weighing 885 grams, with a normal endothelial count of 0.6 per cent., received intravenously 1 c. c. of a very heavy suspension of smegma bacillus heated at 60° C. for an hour. Two days later the endothelial count rose to 4.2 per cent., when a second similar injection was made. Two days after the second injection the blood showed 7.6 per cent. of endothelial leukocytes. The animal, before the first injection, had 8,700 leukocytes per cubic millimeter, 8,300 at the time of the second count, and 6,400 at the time of the last count. As a rule there is some increase in the total leukocyte count, but the number may be decreased as in this case.

Guinea pig 87, weighing 655 grams, with a normal count of 0.7 per cent. was given intravenously 1 c. c. of a very heavy suspension of living smegma bacilli and six days later there were present 10.1 per cent. endothelial leukocytes. Ten days after the injection the count had fallen to 3.9 per cent. Weekly injections were continued for two months with no loss of weight.

Guinea pig 89—685 grams—received 1 c. c. of a very heavy smegma suspension; five days later there were 8.3 per cent. endothelial leukocytes present. Judging from these four animals the endothelial leukocytes reach the maximum number in the blood about four or five days after intravenous injection and then gradually become fewer.

Guinea pig 92, weighing 745 grams, with an endothelial leukocyte count of 2.5 per cent. was given 1 c. c. of a very heavy suspension of killed smegma culture intraperi-

toneally on three successive days. On the sixth day after the first dose there were 10.6 per cent. of endothelial leukocytes, and on the eighth day 15.8 per cent. The animal before injection had 17,000 leukocytes per cubic millimeter and at the time of the last count 27,600, with 26.9 per cent. lymphocytes, 55.6 per cent. neutrophils, 1.1 per cent. eosinophils and 0.6 per cent. basophils. Before injection there were 37 per cent. lymphocytes, 44 per cent. neutrophils, 15.2 per cent. eosinophils and 1.3 per cent. basophils. As occurred in this animal the neutrophils are usually increased, somewhat by the injection, the eosinophils decreased, while the basophils remain about the same. The suspensions made by taking up a heavy 3-inch glycerin agar slant with 6 or 7 c. c. of saline were very heavy.

An intraperitoneal injection with a culture of *Bacillus phlei* was given Guinea pig 96, weighing 435 grams. In three days the endothelial count rose from 0.9 per cent. to 3.8 per cent. Guinea pig 100, weighing 385 grams was given an intravenous injection, and three days later there were present 2.7 per cent. of endothelial leukocytes.

Because of the rapid precipitation from saline of the small clumps of culture of *Bacillus phlei,* the growths from 10 to 20 tubes were scraped from the agar slants and placed at the bottom of a large porcelain mortar and ground for fifteen minutes with 2 c. c. of 2 per cent. gelatin. Two per cent. gelatin was added to make 100 c. c. in all, and for a preservative 0.5 c. c. tricresol was added. By diluting the blood, the leukocyte count of which was simultaneously determined, making a Ziehl-Neelsen stain, and comparing the number of bacilli and white cells, the number of bacilli per cubic centimeter was found to be about 1,750 million. This stock suspension was distinctly less heavy than were the suspensions of smegma bacillus.

Guinea pig 105, with a normal count of 0.8 per cent., was injected intraperitoneally with 1 c. c. of this suspension on three successive days. On the fifth day the count rose to 4.3 per cent. and on the ninth day it was 2.6 per cent. An injection of 2 c. c. was then given, and three days afterwards the count rose to 4.7 per cent. Guinea pig 196, weighing 565 grams, with a normal count of 0.7 per cent., developed a count of 4.3 per cent. after three daily intraperitoneal injections of 2 c. c., but four later counts made while the animal was receiving 2 c. c. every other day showed these leukocytes between 1.5 and 2.5 per cent. Guinea pig 107, weighing 715 grams, with a normal count of 2.3 per cent., received six injections during twelve days before the count rose to 6.1 per cent. During this time it gained 30 grams in weight.

These ten animals are representative of the thirty-six that received injections. It is difficult, even with the gelatin, to suspend *Bacillus phlei* while an injection is being made, and the lower counts obtained with this organism may be due to smaller doses, although an attempt was made to have the suspensions equally heavy.

Guinea pig 87 was kept for three months and four days; at autopsy it was found negative, except for a thickening of the ears and some fibrous adhesions in the peritoneal cavity—(intraperitoneal injections were given during the second and third months). Several of the animals were killed during the height of a reaction and the organs fixed in Zenker's solution for eosin-methylene blue staining. In the liver, lungs, spleen and kidney it is quite easy to find endothelial cells of the capillaries in mitosis. This is in marked contrast to normal animals which receive injections of carbon in suspension, where a rather tiresome search has always been required for the demonstration of endothelial cells in division.

REFERENCES

1. McJunkin, F. A. Arch. Inter. Med., 1918, xxi, 59.
2. ——— Am. Jour. Anat., 1919, xxv, 27.
3. ——— Anat. Record, 1918, xv, 189.
4. Foot, N. C. Jour. Med. Res., 1919, xl, 353.
5. Mallory, F. B. Principles of pathologic histology, 1914, W. B. Saunders Co., Phila., Pa.
6. McJunkin, F. A. Jour. Am. Med. Assn., 1920, lxxiv, 17.
7. ——— Arch. Int. Med., 1918, xxii, 157.
8. ——— Arch. Int. Med., 1919, xxiv, 295.
9. Evans, Bowman, and Winternitz. Jour. Exper. Med., 1914, xix, 283.
10. Warfield, L. M. Jour. Am. Med. Assn., 1915, liv, 1296.
11. Rous, Peyton. Jour. Exper. Med., 1918, xxvii, 459.

OSTEOMALACIA*

A STUDY OF THE EFFECTS OF CERTAIN ORGAN EXTRACTS AND OÖPHORECTOMY ON THE METABOLISM OF CALCIUM AND MAGNESIUM

BY HUGO A. FREUND, A.B., M.D., AND BRUCE C. LOCKWOOD, A.B., M.D.

Respectively Assistant Professor and Instructor in Medicine
Detroit Universiy School of Medicine

DETROIT, MICH.

THE present investigation is the result of an opportunity which the writers have had of studying, clinically, and investigating the chemical pathology of a case of osteomalacia.

Stimulated by the excellent work done in the last few years on the relation of the glands of internal secretion to growth and development, and their effects on chemical changes in the body, the writers have investigated the metabolism of calcium and magnesium during the administration of extracts of certain glands of internal secretion, and after oophorectomy. Furthermore, they have compared these results with those found previous to such treatment.

The following case furnished the opportunity for study:

REPORT OF CASE

Mrs. I. K., age 33 years, Russian, married.

HISTORY—*Present Illness.*—Patient came to the hospital complaining of pain in the right and left legs, of one and one-half years' duration, and pain in her right arm and hand of four months' duration.

Family History.—Her father and mother are living and well. She has three sisters and eight brothers living and in good health. No deaths in the family. The history of her grandparents is unknown.

Past History.—The history of her babyhood: she does not believe that she had rickets or any infectious disease except measles, in her childhood. She had typhoid fever at the age of seventeen. At twenty acute articular rheumatism, for six weeks; at the age of thirty another attack of acute articular rheumatism, which did not last as long, but from which she does not believe she ever fully recovered. She dates the history of her present illness from one and one-half years ago, when a physician first told her she had "bone disease". In reality she describes her present condition as a continuation of her "rheumatic troubles", now of five years' duration. During this period she has been treated intermittently for "rheumatism" by many physicians without a great measure of relief. She was made aware of the fact that she had a "bone disease" in July, 1913, when she broke her right leg near the ankle. The bone did not heal as her physician expected it to, when the fracture was reduced. X-ray revealed "bone changes", she states. Since that time she has not been able to walk. She has grown progressively worse, and now cannot stand because of excruciating pain in both legs.

Menstrual, Marital and Venereal History.—Menses began at the age of sixteen, regular every twenty-eight days, lasting three days; moderate amount and not painful.

Her first child died at age of one week, seven years ago. Since that time she has had three miscarriages: one at two months, another at eight months and another at four

*From the Medical Clinic of Harper Hospital. The work on this case was carried out in 1915. Owing to the war, the writers were unable to fully complete and publish the observations until the present time.

months. Patient denies any venereal infection; neither does the history of her husband point to any.

Physical Examination.—Patient is well-developed and well-nourished female; weight 145 pounds. Frame moderate size, skin elastic, and panniculus moderate amount. Her face is symmetrical, pupils are equal and react to light and accommodation. Mucous membranes are of good color; teeth in fair condition; no visible pyorrhea. The neck is symmetrical; there are no abnormal pulsations. Her chest is of good breadth, depth and length. Both sides expand equally. Patient complains of pain on the least pressure over any of the ribs and the clavicle, as well as the shoulders. Light percussion gives good resonance. Breath sounds reveal a good vesicular murmur. The apex of the heart is in the fifth intercostal space, just outside the nipple line. The upper border of the dullness is in the third interspace; the right border is at the left edge of the sternum. The transverse dullness is three and one-quarter inches. A systolic murmur is heard at the apex and is transmitted into the axilla and slightly into the back. The second sound is clearly heard. The second pulmonic is accentuated. Aortic second is weak. The abdomen is large and flaccid; it is not tender to palpation. The lower pole of the right kidney is just felt. Liver and spleen not palpable.

Examination of the pelvis reveals a slightly relaxed vaginal outlet. There is a slight tear of the cervix. The uterus is in good position. The adnexa are not felt.

Extremities.—The lower third of the right tibia is deformed. There are two small irregular callus-like formations felt on the anterior surface at about the middle third, very tender to the slightest pressure. There are two similar areas on the right tibia. All the bones of the lower extremities are very sensitive to pressure. This is more particularly true of the bones of the pelvic girdle.

Laboratory Examinations.—*Urine.*—Repeated examinations showed occasionally a slight trace of albumin and a few hyaline casts. Also, on several examinations an increase of calcium oxalate crystals. The total quantity ranged from 500 to 1,100 c. c. daily.

Blood.—Differential and total counts normal. Wassermann:—Negative.

Gonorrheal Fixation Test.—Negative.

Roentgen Examination.—These were made of the long bones. The plates show a widespread decalcification with loss of the trabeculations and thinning of the cortex. In the middle third of the humerus and in the upper third of the tibia there are fractures. There is a small amount of callus. The writers would class these as pathological fractures.

X-ray of the head was negative. Sella of normal size and outline.

Discussion of the Earlier Views on Etiology

Soon after osteomalacia was first recognized as a disease, about a century and a half ago, it was shown by clinical and anatomical observation that it was not identical with rickets. It was demonstrated that there was a decalcification of the bone similar to that which takes place when bone is placed in hydrochloric acid. This observation led Lobstein, Virchow, and other pathologists to the view that the essential difference between osteomalacia and rickets was that, in the former, the lime-free bone was normal bone from which the lime had been dissolved by an acid, whereas in rickets the lime-free bone was newly made bone free from inorganic material. The first to doubt the correctness of such an idea was Cohnheim; yet he could not produce proof of his conception, which was that bone is not dead tissue, but has a metabolism the same as other tissues of the body. He believed that the essential process in osteomalacia is not a solution of the lime salts by an acid, but that, when the bone is destroyed, the organic as well as the inorganic substances are taken up by the osteoclasts. Then new bone, free from lime salts, is made up of the organic matrix, just as in rickets.

The theory that in osteomalacia the process is one of halisteresis, whereby the min-

eral constituents are dissolved out by an acid, was given support by the findings of Schmidt, who stated that he found lactic acid in the bones in osteomalacia, and by Moers and Muck, who stated that they found this acid in the urine in cases of osteomalacia. The methods used by these investigators led to incorrect conclusions, as shown by Langendorff and Mommsen, who by the same method found lactic acid in the urine of normal cases, as well as in cases of osteomalacia. Schmuziger, Heuss, and McCrudden, were unable to find lactic acid in their cases. Attempts to produce osteomalacia by the feeding of lactic acid have been unsuccessful. Determination of the acidity of the blood also led to a negative result.

A number of recoveries from osteomalacia, following the removal of the ovaries, has led to a belief among some gynecologists, that the disease is associated with abnormal secretion of the ovaries.

Process in Osteomalacia

In order to better understand the process taking place in osteomalacia, a brief review of the work which has been done on the chemical composition of bone, the metabolic investigations, and the pathological observations, are given herewith. In the process in osteomalacia we may consider (1) the chemical composition of the bone; (2) the percentage of inorganic salts.

The fact that the *inorganic constituents* of the bone are diminished in osteomalacia, has been thoroughly established, as shown in Table 1.

Table 1.

Percentage of Inorganic Matter in Bone

Investigator	Normal	Osteomalacia
Frerichs	65.9—70.2	
Lehman	67.72	
Zalesky	56.44	
Langendorff and Mommsen	54.24	37.8
Durham		45.37
Huppert		25.71
Moers and Muck		38.23
Moers and Muck		35.11
McCrudden	48.54	28.02

McCrudden in summarizing the studies in the *chemical analysis* of bone finds that: (*a*) the percentage of calcium in the dried bone in osteomalacia is decreased to nearly one-half of its normal value; (*b*) the amount of magnesium is increased nearly four times; (*c*) the amount of phosphate is variable, usually decreased but not to the extent which is found in calcium; (*d*) the percentage of sulphur is greatly increased. This would be expected when it is considered that the organic matrix of bone, which is greatly increased in osteomalacia, is made up to a great extent of glycoproteins, which are rich in sulphur. Therefore, the essential changes as found in the inorganic constituents of bone that occur in osteomalacia are a loss of calcium content, with an increase in the amount of magnesium content. It is assumed that the latter is laid down to compensate for the loss of the former.

Metabolic Investigations in Osteomalacia

Calcium.—Many of the earlier investigators, namely Moers and Muck, Fehling, Wenecke, and Schmuziger and Schuchardt, made determinations of calcium in the urine in cases of osteomalacia, but as this represents only a part of that excreted, and as the food was not examined, these results are of little value.

A number of investigators have made complete metabolic studies in osteomalacia. The following table shows changes in calcium metabolism.

Table II.

Loss in Calcium

Investigator	Days	Food	Excreta	Loss
Lunbeck	5	2.965	5.604	2.639
Korczymski	4			
His	11	8.66	9.48	.82
His	7	6.08	7.24	1.16
Neuman	5	11.26	11.65	.39
Hotz	8	10.78	12.73	1.95
Goldthwait, Painter, Osgood	8	4.56	5.66	1.10
McCrudden (1912)	6	3.44	8.27	4.83
McCrudden	10	21.17	22.14	.97
	To which the writers can now add their own results:			
Freund and Lockwood	7	7.746	8.22	.474

Magnesium.—Table III shows the changes in the metabolism of magnesium.

Table III.

Retention or Loss in Magnesium

Investigator	Days	Food	Excreta	Retention	Loss
Goldthwait, Painter, Osgood and McCrudden	8	2.207	2.015	.192	
McCrudden	10	4.69	4.55	.14	
Freund and Lockwood	7	2.87	2.897		.027

Phosphorus, Sulphur, Nitrogen.—These salts have been studied by Goldthwait, Painter, Osgood and McCrudden. The writers have made no study of these salts, inasmuch as it was felt that the metabolism of calcium and magnesium were chiefly concerned in the disease process.

Pathological Observations

The bones in osteomalacia are soft and can often be squeezed or twisted. On section, cystic cavities of various sizes are often seen, much reducing the bone substance. In consequence, the specific gravity is often reduced from 1.877 to as low as 0.72 (Dock [1]). The bones are easily penetrated by the roentgen rays, depending upon their decreased density.

On microscopical examination, osteoid tissue is found in the interior of the bone in proximity to the Haversian canals. In rickets, similar osteoid tissue is found at the junction of the epiphysis and diaphysis and beneath the periosteum, and is considered new bone. There is reason to assume that the osteoid tissue in osteomalacia is also new tissue. In fact von Recklinghausen, who made an exhaustive report on the histology in this condition, calls attention to the abundance of osteoblasts and Sharpey's fibers, and to the "youthful" appearance of many of the bone corpuscles as evidence that the osteoid tissue is new tissue.

Tachiro has made the same observation and confirmed von Recklinghausen's work. He observed that the osteoid tissue is continuous with and contiguous to young proliferating endosteum, and that the new formation of osteoid tissue is parallel with the disappearance of old bone. Incidently, it might be stated that both of them regard ostei-

tis deformans as a localized osteomalacia.

Hanan has discovered that in many cases of pregnancy with apparently sound bones during life, at postmortem, especially, the bones of the pelvis show an appearance similar to osteomalacia, i. e., the formation of osteoid tissue with osteophytes. As is well known, many cases of osteomalacia followed close upon pregnancies.

METHOD OF STUDY

The general method of performing the experiments was, with slight variations, essentially the same as used by others. Each experiment was carried on through a period of seven days. Cooperation was obtained with the patient, who was in a private room at Harper Hospital with a special nurse constantly in charge.

Food.—The patient was in each period allowed the full "house diet." Meat, however, was excluded from the diet to reduce the uric acid in the urine, which might interfere with the permanganate method of estimating calcium. An example of a twenty-four hour diet is as follows:

Breakfast:	Ralston's food	77	grams
	Potatoes	16.1	"
	Toast	43.8	"
	Egg	one	
	Sugar	20.	grams
	Cream (20 per cent.)	50	c. c.
	Tea	130	"
	Water	200	"
10:00 A. M.	Wine	30	c. c.
	Water	200	"
	Orange	one	
	Figs	two	
Dinner:	Soup	90	c. c.
	Potato	84.7	grams
	Chicken	65.8	"
	String beans	55.9	"
	Bread	26.9	"
	Biscuit	26.7	"
	Jelly	64.9	"
	Tea	100.0	c. c.
	Crackers	three	
3:00 P. M.	Water	200	c. c.
Supper:	Potato	109	grams
	Lettuce	47.3	"
	Bread and butter	40.6	"
	Jelly	62.8	"
	Sugar	12.0	"
	Tea	160	c. c.
8:00 P. M.	Wine	40	c. c.

The food the patient ate was weighed, and one-fourth the quantity of each food eaten was saved for analysis. The whole quantity for each period of seven days was mixed and evaporated to dryness. It was then well mixed with alcohol and again evaporated to dryness, and the mixing with alcohol and evaporation again repeated, which brought the food into a very dry condition. It was then crushed in a mortar and ground to a fine powder, thoroughly mixed, the whole quantity weighed, and an aliquot part taken for analysis.

Urine.—The urine was collected from six o'clock each morning until six the following morning, and the total twenty-four hour quantity made up to 1,000 or 1,500 c. c., according to the quantity, and one-fifth (200-300 c. c.) placed in a large bottle, preserved with chloroform, and saved to be mixed with an alioquot part of each succeeding twenty-four hour urine for that period. The analy-

sis was made from the urine saved, and taken to represent one-fifth of the total quantity excreted for that period of seven days.

Feces.—The stools were saved and analyzed. The patient was starved from noon of each day before the experiment until the following morning, in order that the feces which came from the food, taken before the experiment, might be separated, as much as possible, from that taken during the experiment. One-half hour before breakfast on the first day of each period, the patient was given a charcoal emulsion. This blackened the first stool belonging to the experiment. The patient was starved from the evening of the last day until noon the following day, when charcoal was again given and the stool saved until it began to be black. The stools for the period were all mixed together, evaporated to dryness, mixed with alcohol and again evaporated, powdered, well mixed and weighed and samples taken for analysis. The patient was given an enema of distilled water every other day. One-fourth the amount of water used was placed in the food for analysis. The writers were greatly assisted in their determinations by Mr. Floyd Robinson, chief of the analytical department of the Detroit Testing Laboratory.

Method for Determining Calcium and Magnesium

In the Case of the Stools.—The dried sample is very thoroughly mixed and finely pulverized and the aliquot is ignited at a low rate heat to a complete ash. Five grams of the ash are digested with hydrochloric acid in a beaker, transferred to a 500 c. c. volumetric flask and made with water to the mark. Twenty-five c. c., corresponding to .25 grams of the original ash, are now transferred to a breaker made strongly alkaline with ammonia and cleared by the addition of hydrochloric acid; a slight excess of ferric chlorid is now added (sufficient to combine with the phosphoric acid present) and ammonia hydroxid added in slight excess. The precipitation is well filtered off and washed with water; the filtrate is slightly acidified with hydrochloric acid, a little more ferric chlorid added and more ammonia, to alkalinity. The precipitate is again filtered and well washed, the filterate being set to one side, marked "A". The two precipitates thrown down by ammonia in each instance are now transferred to a beaker, water added and the precipitates dissolved by the addition of a small amount of hydrochloric acid. When perfectly clear, ammonium hydroxid is added again in slight excess, and the precipitate containing ferric hydroxid and ferric phosphate filtered out and washed with water. The precipitate is discarded, the filtrate is added to filtrate "A". To the combined filtrates is now added ammonium hydroxid and ammonium oxalate in slight excess. The calcium is precipitated as calcium oxalate, filtered off, well washed and set aside for the determination of calcium. To the filtrate from the calcium oxalate precipitate is now added slight excess of disodium hydrogen phosphate. The magnesium ammonium phosphate precipitate is filtered off, ignited, in a crucible and weighed finally as magnesium pyrophosphate, from which magnesium is calculated.

The calcium oxalate precipitate above is returned to a beaker and digested for thirty minutes on the steam bath with 25 per cent. sulphuric acid. It is then titrated with standard potassium permanganate solution and the calcium estimated in this way.

In the Case of the Urine.—An aliquot of the sample is evaporated to dryness and carefully ignited to remove organic matter. The ash is then dissolved in hydrochloric acid and the calcium and magnesium is determined as above.

(1) *Metabolism of Calcium and Magnesium in the Author's Case of Osteomalacia*

As will be seen from Table IV, there was a loss of calcium. There was also a loss of magnesium which is at variance with the findings of many previous investigations. Another interesting point is the fact that the greater portion of calcium was eliminated in the urine. This was also found in the four periods which followed.

Table IV.

Loss of Calcium and Magnesium. First Period

	Food	Stool +	Urine =	Elim.	Balance
CaO	7.746 grams	1.85	6.37	8.22	.474 neg.
MgO	2.87 "	1.737	1.16	2.897	.027 "

(2) *Metabolism of Calcium and Magnesium During Administration of Thyroid Extract*

A review of the literature shows that the thyroid gland has been thought to have an influence over calcium metabolism. Hoenicke found a goiter in a considerable number of cases of osteomalacia in patients who also had hyperthyroidism. Towles [2] investigated the calcium metabolism in Basedow's disease and concluded that it shows no special peculiarity. Falta, Bollaffio, and Tedesko [3] found that thyroid in treatment brought about an increased excretion of calcium, after the thyroid had been removed.

During the second period of seven days of the writers' experimentation, patient was given five grains of desiccated thyroid gland (Park-Davis & Co.) three times per day.

It is evident that the loss of calcium and magnesium is much greater here than in the preceding period.

Table V.

Results Obtained Following Administration of Thyroid Extract

	Food	Stool +	Urine =	Elim.	Balance
CaO	5.236 grams	.908	5.715	6.683	1.447 neg.
MgO	5.256 "	1.568	1.015	2.583	.327 "

(3) *Metabolism of Calcium and Magnesium During Administration of Pituitrin*

That the pituitary gland exerts an influence on metabolism and bone growth is well known from studies in connection with the cause of acromegaly (Fischer [4]). The observations on calcium metabolism in acromegaly have given variable results. Some have thought this due to the fact that there is often a stage of atrophy and hyposecretion following the stage of hypersecretion. Falta, Bollaffio, and Tedesko [3], Tranchini [5], Mochi [6] and Malcolm [7], found that the administration of pituitary extract caused a loss of calcium and magnesium. Bergeim, Stewart, and Hawk [8], investigated the matabolism of a patient with acromegaly and noted a distinct retention of calcium, magnesium and phosphorus. During the third period of investigation, the writers gave their patient 1 c. c. of pituitrin (Park-Davis & Co.) hypodermically, morning and night. The results are tabulated in Table VI.

Table VI.

Results Obtained Following Administration of Pituitrin

	Food	Stool +	Urine =	Elim.	Balance
CaO	1.632 grams	.506	3.730	4.236	2.604 neg.
MgO	3.196 "	1.696	1.515	3.211	.015 "

As will be seen, there was a much greater loss of calcium than in either of the two preceding periods. Magnesium is scarcely affected.

(4) *Metabolism of Calcium and Magnesium during Administration of Parathyroid Extract*

A review of the literature shows that the parathyroids have been found to exert considerable influence over the metabolism of mineral salts. Erdheim [9] observed that in rats, after the parathyroids had been removed, the dentine of the rapidly growing incisor teeth ceased to calcify, but that after successful transplanting of the glands the process again commenced. Erdheim [10] and Canal [11] also found that callus formation was retarded, due to the deficient deposition of calcium salts. McCallum and Voegtlin [12], Pexa [13], and Aschenheim [14], have found a decrease in the calcium contents of the blood and brain of dogs killed in parathyroid tetany. Leopold and Von Reus [15] found little change in adult animals, but some decrease in the young. Cook [16] found an increased calcium content of the brain, and was unable to detect any increased elimination of calcium. Morel [17] found that the growth of bone in the young but not in the adult animal was favored by parathyroid extracts. McCallum and Voegtlin [18] and Fourina [19] found an increased excretion of calcium in the urine after parathyroidectomy. Musser and Goodman [20] found no increased excretion of calcium in the urine.

The tetany following parathyroidectomy can be relieved immediately, although temporarily, by the injection of a soluble salt of calcium, or somewhat less readily by injection of salts belonging to the same chemical class.

Bergeim, Stewart and Hawk [22] studied the calcium metabolism of a man after complete removal of the thyroid, and parathyroid glands. A slight retention of calcium was noted with a low urinary excretion. The patient did not develop tetany, and lived thirty-nine days after the operation. The parathyroids were unrecognizable, due to a neoplastic infiltration, and it was suggested that there had been a gradual decrease in parathyroid activity, with the development of a compensatory mechanism in which the pituitary played a part.

During the fourth period, the writers gave their patient 1-10 grains (0.00648 gram) of desiccated parathyroid extract (Parke-Davis & Co.) The results are recorded in Table VII.

This was in marked contrast to the results in the other periods, and indicated a connection between calcium metabolism and the parathyroids.

Table VII.

Results Obtained Following Administration of Desiccated Parathyroid Extract

	Food	Stool + Urine = Elim.			Balance
CaO	5.656	.630	4.410	5.040	.616 pos.
MgO	3.460	1.285	2.685	2.685	.775 "

(5). *Metabolism of Calcium and Magnesium in a Case of Osteomalacia after Removal of Both Ovaries*

A review of the literature shows that Fehling [23] was the first to advance the theory that osteomalacia is due to an overactivity of the ovaries. Noting the good results obtained by Tochier [24] and Levy [25] after removal of the ovaries, he performed ovariotomy on a number of patients, with good therapeutic results, and advised castration as a cure for the disease. Since then a large number of cases have been reported

as cured or improved, yet many were followed only a short time. It is well known that cases of osteomalacia often have periods of quiescence. Among those reporting such cases are von Winckel [26], Wheaton [27], Polgar [28], Latyko [29], Neumann [30], and Truzzi [31]. Bulius [32] made a careful histological examination of the ovaries of six cases of osteomalacia, with negative results. McCrudden [33] made a study of the effect of castration on metabolism, by castrating several adult male and female dogs, and making complete metabolism studies on them, with the conclusion that castration had no effect on the metabolism of adult animals.

Goldthwait, Painter, Osgood and McCrudden [34], after finding a loss of calcium in an osteomalacia patient, removed the ovaries, and a few months later found a retention of calcium as though the process had become cured. However, after waiting over a year and then doing a third complete metabolism experiment, they found her condition worse than ever, with a rapid loss of calcium.

In the writers' patient, after the preceding study with glandular extracts, a few days were allowed to elapse. The patient not having improved clinically, was anxious for any surgical procedure which might promise relief. On May 7, 1915, oophorectomy was performed by Dr. Max Ballin. The left ovary carried large hemorragic cysts; the right ovary had large serous cysts. Abdominal exploration was negative. Microscopic examination of ovaries was negative except as observed macroscopically.

Patient recovered from the operation without incident.

On May 22nd the last seven-day period of study was commenced. The results are given in Table VIII.

As will be seen from the table, the loss of calcium was greater following ovariotomy than in any preceding period. After a later lapse of one year the writers learned that the patient had grown progressivly worse.

Table VIII.

Results Obtained Following Ovariotomy

	Food	Stool + Urine = Elim.			Balance
CaO	1.644	1.350	5.38	6.73	5.086 neg.
MgO	2.565	1.610	1.245	2.855	.291 "

CONCLUSIONS

From their observations the writers conclude that their work bears out the results of other investigations, viz., that there is a marked calcium loss. The magnesium was not retained in this case but, on the other hand, showed a minute loss.

In contrast to other cases the greater amount of calcium was excreted through the urine.

The administration of glandular extracts exhibited a striking effect in but one instance. This could not be followed up after all analyses were completed because the patient passed out of their control.

RESULTS

The results were as follows:

1. During thyroid administration there was a marked increase in the loss of both calcium and magnesium.

2. After pituitrin there was a still greater loss of calcium, while the magnesium was scarcely affected.

3. During parathyroid administration there was a retention of both calcium and magnesium.

4. After removal of the ovaries there was a much greater loss of calcium and a slightly greater loss of magnesium than at any preceding observation.

REFERENCES

1. Dock. Modern medicine, Osler and McCrae.
2. Towles, C. Am. Jour. Med. Sc., July, 1910, cxl, No. 1.
3. Falta, W., Bertelli, G., Bollaffio, M., Tedesko, F., Rudinger, A. and Verhandl, I. Cong. f. inn. Med., 1909, xxvi, 138.
4. Fischer, B. Frankfurt. Ztschr. f. Path., 1910, v, 357.
5. Tranchini, G. Berl. klin. Wchnschsr,
6. Mochi, A. Riv. di. patol. nerv., 1910, xv, 457.
7. Malcolm, J. Jour. Physiol., 1903, xxx, 270.
8. Bergeim, Stewart and Hawk. Jour. Exp. Med. Sept., 0000, xx, No. 3.
9. Erdheim, J. Frankfurt. Ztschr. of Path., 1911, xii, 238, 295.
10. Erdheim, A. Arch. perle, sc. med., 1910, xxxiv, 163.
11. Canal.
12. McCallum and Voegtlin. Jour. Exper. Med., 1909, xi, 118.
13. Pexa, V. Arch. f. Kinderh., 1910, i.
14. Aschenheim, E. Monatschr. f. Kinderh., 1910, lx, 366.
15. Leopold von Reuss. Wein. klin. Wchnschr., 1908, xxi, 1213.
16. Cooke, J. V. Jour. Exper. Med., 1910, xii, 45.
17. Morel, L. Compt. rend. Soc. de biol., 1909, lxvii, 780.
18. McCallum and Voegtlin. John Hopkins Hosp. Bull., 1908, xlx, 91.
19. Fourina, A. Compt. rend. Acad. d. sc., 1909, cxlviii, 1622.
20. Musser and Goodman. Univ. Penn. Med. Bull., 1909, xxii, 83.
21. Cooke, Am. Jour. Med. Sc., Sept., 1910.
22. Bergeim, Stewart and Hawk. Jour. Exp. Med., Sept.,0000, xx, No. 3.
23. Fehling. Arch. f. Gynack., 1891, xxxix, 171.
24. Tochier. Lyon med., 1879, xxxi.
25. Levy. Ztschr. f. Geburtsh. u. Gynack., 1892, xxiii.
26. von Winckel, S. Klin. Vortr. (Volkmann's), new series, No. 71.
27. Wheaton. Northwest, Lancet, 1891, xi, 389.
28. Polgar. Arch. f. Gynack., 1895, xlix, 30.
29. Latyko. Allg. wien. med. ztg., 1893, xxxviii.
30. Neumann. Arch. f. Gynack., 1896, li, 130, xlviii, 472.
31. Truzzi.
32. Bulius. Beitr. z. Geburtsh, u. Gynack., 1898, i, 138.
33. McCrudden. Jour. Biol. Chem., 1910, vii, No. 3.
34. Goldthwait, Painter, Osgood and McCrudden. Am. Jour. Physiol., 1905, xiv, 211.

LATE CARDIORESPIRATORY MANIFESTATIONS OF "GASSING" AS EXHIBITED BY RETURNED SOLDIERS*

BY FRANK SMITHIES, M.D., F.A.C.P.

Associate Professor of Medicine, School of Medicine, University of Illinois; Medical Consultant to the United States Public Health and Marine Hospital Service; Gastro-enterologist to Augustana Hospital

CHICAGO, ILL.

PART I

CONSIDERATION OF THE POISONOUS WAR GASSES.—The first lethal gas employed by the Germans apparently depended for its vicious action upon chlorin and its chemical affiliations. This gas produces toxic effects with extreme rapidity—as in fact, do all gasses derived from the halogens. Later were introduced phosgen and chlorpicrin—gasses with immediate action less severe than that of chlorin, but with delayed effects of serious and persistent character. Gasses of this type are fatal or disabling because of their ability to cause destructive lesions in the respiratory tract. Underhill has demonstrated experimentally that the respiratory lesions are primarily those of congestion and edema. Other effects are secondary. Underhill is of the opinion that absorption of these gasses into the blood stream does not occur. Abnormalities in respiration, heart-beat, temperature, concentration of the blood, water content of the lung and other tissues, the chlorid content of the blood and tissues, kidney excretion, red and white blood-cell estimation and the respiratory-hemic function would all seem to depend upon the induction by gas of pulmonary congestion and edema. Clinically, these toxic pathological changes in the respiratory structures lead to dyspnea, painful respiratory action, injury or destruction of lung parenchyma and to partial or complete asphyxia.

The mechanism involved in the production of respiratory damage by lethal gasses derived from the halogen group would seem to depend upon changes in blood concentration. In the rational treatment of acute gassing, this fact must be generally appreciated in order that suitable therapeutic measures may be instituted without loss of time. In the late war it is doubtful if the mode of action of the halogen group of lethal gasses was common knowledge among medical officers in stations near the front. In consequence, lives were perhaps unnecessarily sacrificed or permanent damage to the respiratory tract of soldiers resulted more commonly than would have been expected.

Underhill's researches have shown that changes in blood concentration following the exhibition of a halogen-derived gas-(phosgen) occur in two distinct stages. *The first stage* lasts from five to eight hours. In this stage there is a noticeable dilution of the blood. This dilution of the blood apparently results from the storage of red blood-cells temporarily in the lung, with the consequent lowering of blood-cell content in the peripheral circulation. There may perhaps also be an actual dilution of blood—i. e., an increased blood volume—in response to strong irritation-stimuli by the gas upon the respiratory tract. Whatever may be the actual mechanism, there quickly follows an increased accumulation of fluid elements of the blood in a lung already embarrassed by an abnormal number of blood-cells. These phenomena lead to pulmonary edema, embarrassment and dilatation of the heart, and —unless the mechanical condition is remedied—to death by asphyxia. Chemically, at

*Address in Medicine, Mississippi Medical Association, Louisville, October 22, 1919.

this time, the chlorid content of the lung is greatly increased, while the chlorid output from the kidneys is much reduced.

In the *second stage* of phosgen poisoning, pulmonary edema reaches its maximum, peripheral blood-volume is decreased, the heart is small, its rate accelerated, the blood chlorids are above the normal concentration and the chlorid output from the kidneys much increased. In this stage of blood concentration a peripheral circulation of less than normal efficiency is maintained. In this circumstance, unless the heart rate is increased, the temperature becomes subnormal and the patient dies. It is thus apparent that apart from the actual damage resulting to the respiratory tract from edema and blood-cell accumulation, the prognosis in acute gas-poisoning is greatly limited by the possibilities of cardiac inefficiency. It is quite likely that much of the permanent damage to the cardiorespiratory mechanism occurs during the first forty-eight hours following gassing by halogen-derived agents.

Knowledge of the mechanism by which halogen-derived gasses cause cardiorespiratory embarrassment would seem to be essential for directing proper therapeutic procedures. In the *first stage* of the poisoning, when there is pronounced peripheral blood dilution, generous venesection would seem to be indicated in order to reestablish proper blood distribution and concentration. During the *second stage,* where peripheral blood concentration is the rule, those therapeutic measures—as for example, the introduction intravenously of normal salt solution—are indicated which effect proper blood-volume in the peripheral arteries and capillaries.

Mustard Gas Poisoning.—Toward the latter part of the late war, a new and intensely toxic "gas" was introduced. This gas, on account of its pungent or garlic-like odor, was popularly known as "mustard gas". Chemically, this gas is not a "gas", but an oily liquid of high boiling point, slowly vaporized when exposed to air. Its chemical nomenclature is dichlorethylsulphid. This poisonous substance, in dilutions as great as one to fourteen million, is capable of producing most serious local damage to the respiratory tract, the eyes and skin and the alimentary canal. Complete experimental and clinical studies of the pathologic lesions produced by "mustard gas" have been made by Giraud, Mandel and Gibson, Pissarello, Randu, McNee, Karsner, Marshall and Miller and Warthin and Weller.

Upon the skin and mucous membranes, particularly in folds and crevices, the lesions vary from simple hyperemia to eschar formation with massive, or multiple minute, areas of sloughing. The local damage to skin and mucous surfaces is not rarely intensified as a consequence of secondary infection. The eye lesions are apt to be especially serious. Within a few minutes following exposure even to dilute concentrations of dichlorethylsulphid, corneal necrosis may occur. Associated with this, there is usually conjunctivitis, which may eventually become purulent, or, as healing occurs, result in marked cicatrization. In not a few instances the whole eye has been destroyed by suppurative panophthalmitis. Even after apparently satisfactory recovery from the acute effects of "mustard gas" poisoning, the eyes of gassed patients often exhibit a peculiar sensitiveness to the action of light, dust, gas or other fumes.

By far the most serious effects of "mustard gas" poisoning are those upon the respiratory tract. Even in great dilution, there occurs extensive injury to the epithelial lining the air passages. If the "mustard" vapor is concentrated, the local damage to the respiratory tract is so extensive as to early be incompatible with life or to result in serious respiratory embarrassment extending over weeks, months or even years. Particularly distressing are those anomalies consequent upon damage to the mucous lining of the nose, pharynx, trachea and larger bronchi. In these situations, the mucous membrane is often entirely destroyed, leaving unprotected, raw or exudate-covered surfaces. In these unprotected areas, suppurative bacteria may grow luxuriantly, resulting in purulent bronchitis, bronchiectasis, pulmonary abscess or mas-

sive pneumonia. This lowering of local tissue defense in the respiratory tract not uncommonly permits extensive and permanent pulmonary damage with or without severe systemic consequences, as a result of secondary changes by growth of the pneumococcus, influenza and tubercle bacilli. If the affected individual does not quickly die following "mustard gas" vapor inhalations, the attempt at repair of this damage is followed by a scarification of small or large, adjacent or widely disseminated, sections of the respiratory passages. There may be actual destruction of considerable lung parenchyma or, due to local sloughing, hemorrhage, increased exudate or thickening of the walls of the air passages. Incapacitating or even asphyxiating accumulations may gather in portions of the respiratory tract. Edema, hyperemia, necrosis and ulceration of the vocal cords or of the mucosa of the larynx, frequently enough to cause temporary or permanent loss of voice, may result. The catarrhal inflammation of the pharynx may spread to the ear, with resultant temporary or permanent deafness.

"Mustard gas" may be productive of serious damage to the alimentary tract as a consequence of vapor-laden air, contaminated saliva, or food being swallowed. The lesions in the digestive tract vary from simple, local or extensive hyperemia, to gross or minute local, or wide-spread areas of ulceration or necrosis. It is quite likely that gastro-intestinal damage results with greater frequency than is generally thought. This point has been emphasized by Warthin and Weller. They call attention to the fact that in the contemplation and treatment of strikingly incapacitating injury to the air passages, the milder and, clinically, less dramatic lesion of the alimentary tract may not be fully appreciated. There would appear to be no evidence of systemic poisoning consequent upon the absorption of "mustard gas" from the skin, eyes or mucous surfaces. Warthin and Weller have shown experimentally that there occur no constitutional effects from the gas when it is applied externally. When the gas is injected intravenously, death takes place quickly as the result of toxic action upon the central nervous system or of direct action of the gas in the mucosa of the respiratory and digestive tracts.

It has apparently been shown, both clinically and experimentally, that there is a great individual susceptibility to "mustard gas". This susceptibility is frequently pronounced. Some observers, particularly Marshall, estimate that while certain groups of individuals are intensely sensitive to the gas, others are but slowly or lightly affected by even moderately strong concentration of the vapor. Warthin and Weller are of the opinion that individuals of the thymicolymphatic type are constitutionally oversensitive. They explain this increased sensitiveness as being due to difference in the skin lipoids and to an especial susceptibility of these persons to pathologic lesions of the skin. If this observation is true, then it might be useful to attempt to keep such individuals from contact with "mustard gas" vapors. Observers are unanimous in the opinion that there is a racial phase to "mustard gas" susceptibility. Marshall has commented upon the fact that Negroes are far more resistant to gas poisoning than are Caucasians. Other observers have statistically shown the correctness of this fact.

The mechanism by which "mustard gas" exerts its toxic action would seem to be moderately well understood. When "mustard gas" is hydrolized in a test-tube it is split up into hydrochloric acid and dihydroxyethyl-sulphid. These cleavage products are not of themselves of great toxicity to humans or to experimental animals, when applied to the skin or the mucous surfaces or when injected into the blood stream. They are readily soluble in water. Such dilution in the body doubtless renders them not highly poisonous. They have a low lipoid solubility and consequently are not able to readily penetrate the body cells and cause death. On the other hand, the unsplit, unhydrolized "mustard gas" is *not* readily soluble in water or body fluids and is thus not readily diluted. "Mustard gas" has, however, a *high degree of*

lipoid solubility. This physical attribute permits its ready and extensive penetration into the interior of cells.

When "mustard gas" becomes intracellular, it is quite possible that cleavage by hydrolysis takes place, with the resultant liberation *within the cell,* of free hydrochloric acid. This acid, intracellularly, destroys the vital mechanism of that cell. Knowledge of this fact apparently suggests that the ideal prophylaxis against damage by "mustard gas" would be the exhibition of some non-toxic substances, capable of penetrating body cells and there neutralizing free hydrochloric acid as rapidly as it is formed by the hydrolization of the absorbed dichlorethylsulphid.

PART II

Clinical Material Forming the Basis of This Report.—In examination of returned soldiers at the Public Service Hospitals of Chicago, the writer was quite early in the work impressed by the number of men appearing for examination on the ground that their lungs might harbor foci of tuberculosis or that their hearts were the seats of serious or incapacitating organic lesions. It was early impressed upon the writer that, not uncommonly, there seemed to be wide discrepancies between the complaints of these patients and such physical anomalies as might serve as a basis for these complaints.

To those who have not had experience in the examination of men about to be inducted to military service, or of men already in military service—particularly men of the distinctly combat units—it may be necessary to emphasize the frequency of the deliberate or of the unconscious malingerer. To physicians who have had limited experience with soldiers, it is perhaps important to state that the great number of those men who appeared with the above hinted-at cardiorespiratory malfunction came largely because they sought compensation for assumed ailments or compensation for disturbances, which they considered serious and incapacitating.

However, even when the above great group of so-called cardiorespiratory patients had been eliminated, there still remained a goodly proportion of men in whom it was possible to demonstrate disease of the heart or the lungs. In some of these patients such damage had undoubtedly existed previous to induction to military service and had been overlooked during the strenuous days of physical examinations by members of military enlistment stations or of draft boards. The life in barracks, camps or battle had aggravated what may have been previously mild affections, with the result, that, after the stimulus of military regime had been lost, symptoms and signs of disease became manifest or were discovered. Such patients not rarely exhibited active tuberculous foci, pleural and lung anomalies consequent upon pneumonia, influenza or syphilis, or had definite evidence of enlargement, leakage or faulty muscular efficiency of the heart.

Another group, not rarely suspected of harboring tuberculous foci, was formed by those men, who in military service had experienced illness from the acute exanthemata, from pneumonia and from influenza. In this class were not uncommonly found damaged hearts and kidneys, and gross respiratory affections, such as chronic pleurisy, empyema, pulmonary abscess, bronchiectasis or unresolved pneumonia.

Lastly, certain cardiorespiratory patients quite clearly segregated themselves into a group of men who had experienced gassing. A word of caution might here seem not inadvisable. While in the main, soldiers are prone to bear physical injury without complaint, yet there are a limited number who through cupidity, constitutional unfitness or psychic upsets consequent upon unusual environment and stress, a limited number, who, knowingly or unknowingly exaggerate symptoms and conveniently attribute them to the rather popular cause—gassing.

Where compensation is sought, suspicion should always exist with respect to damage caused by lethal gasses, until it can be shown that gassing has actually been experienced by the patient. As a rule, the individual who has been gassed remembers the

date of his disablement, gives an intelligent description of his symptoms following gassing and of his incarceration, subsequently, in hospitals. He may exhibit external evidence of the gas, such as conjunctivitis, corneal scars, skin lesions or excessive local skin pigmentation where superficial burns had previously existed. Not infrequently he is well acquainted with the kind of gas causing disability. He is able to designate the battle fronts on which the gassing took place, and this general fact may be corroborated readily by reference to official reports of enemy activities in those battle areas. These proofs that the individual has been where gassing was known to be common are, it would seem, in many instances of greater etiological significance in respect to cardiorespiratory disturbances than is the statement by the patient that he has been gassed and that a group of cardiorespiratory symptoms has resulted from this form of injury.

After going over a large material, it was found that there were 85 patients affected with some form of cardiorespiratory disorder, in whom trauma from gassing could be proved, and in whom the symptoms or signs of heart and lung malfunction were seemingly attributable to that gassing. It is with the analysis of these 85 patients that this report is especially concerned.

Of the 85 gassed soldiers available for analysis, 80 were *white* and 5 were *colored,* a ratio of approximately 16 to 1. These figures would appear to be important, because other things being equal, they substantiate, clinically, Marshall's experimental observation that whites are far more susceptible to gas poisoning than are negroes.

The average age of the patients was rather greater than twenty-three and one-half years —that is, a group of men incapacitated at the period of life when, economically, they should have been active producers. In view of the great demand for labor in all industries, and because of the relatively large proportion of gassed men in combat units, it would seem that correct estimate of the degree of disability present in these men is imperative. Such estimate is of prime importance as an influence bearing upon current labor shortage and social unrest.

Kind of Gas to Which Injury Was Attributed.—There must of necessity be a possibility of error in collecting data of this kind, but, perhaps, the error is not as great at it might at first seem to be, inasmuch as soldiers who had been sent to base hospitals, upon being gassed, commonly learned, from their medical officers, the source of their disability. Of the 85 men, in but 3 were we unable to learn something respecting the type of gas poisoning from the effects of which they claimed to be suffering. In 59 men had there been poisoning by "mustard gas", 10 by phosgen, 4 by both "mustard gas" and phosgen, and 9 by chlorin gasses. The greatest number of men received their injury in the battles of the Argonne Forest, Château Thierry, Verdun and Soissons. Only two men of the series had been injured when not actually engaged in battle; these men had been careless during "gas" maneuvers.

Immediately following gassing, the major portion of the men had been sent to near-by base hospitals for treatment. Only 1 man had not been hospitalized. The duration of incarceration in base hospitals ranged from a few days to many months. For 54 men it averaged 2½ months. There were 23 men who were so greatly incapacitated as to require hospital care for longer than six months. Such prolonged hospital residence had not infrequently been necessary as a consequence of acute infectious ailments being superimposed upon the cardiac or the respiratory malfunction precipitated by the gassing.

The patients whom we had the opportunity of observing appeared at General Hospital No. 2, United States Public Health and Marine Hospital Service, at an average period of 10.6 months following the gassing. In one instance 17 months had elapsed since the man had been exposed. These figures strongly emphasized the potency of lethal gasses as disabling agents. Even though the soldier survives the initial trauma, the economic disadvantage of his continuing below par for a year or longer is quite apparent. Such ob-

servations must be a source of fiendish satisfaction to those responsible for the introduction of poisonous gases into modern warfare.

Present Complaints.—In this series of men, it would have been of great satisfaction to have been able to compare symptoms and physical anomalies when the patients appeared for examination at General Hospital No. 2 with those exhibited when they were admitted to the various base hospitals abroad, shortly after being gassed. A comparison of this kind would have proved of great worth toward the estimation, at least approximately, of how much of the primary disturbance to cardiorespiratory function persisted, to what extent repair had taken place, and how frequently the clinical picture had assumed espects differing from those primary to gassing. Such comparison would have great prognostic significance with respect to the future course of this group of men. The nature of the problem, prevented accurate comparison between the primary clinical upsets caused by gassing and those seen after an interval of nearly a year.

The histories indicate that where men are not so severely gassed as to die very soon after exposure, treatment in base hospitals abroad has been for the relief of aphonia (7 men), visual disturbances (16 men—7 men were blinded), chest pains (58 men), dyspnea (53 men), obstinate cough (79 men), which cough was commonly productive (69 men) or even hemorrhagic (6 men), and cardiac distress, often accompanied by pronounced cyanosis, dyspnea, tachycardia or dizziness. In 9 men lobar pneumonia had early complicated gas exposure, and in 18 men, shortly after the subsidence of the acute disturbances attributable to gassing, influenza had appeared. There were severe burns about the face, eyes, lips, chest and extremities, generally by "mustard gas", in 12 cases. In 2 men hematuria was noted very soon after gassing. In 10, severe gastro-intestinal distress had been experienced, in 3 hemorrhage from the stomach, such being seemingly due, as previously mentioned, to the local effects of "mustard gas" upon the gastric mucosa.

When we had the opportunity of examining the gassed men, respiratory distress had so generally persisted, that, in the major portion of the patients, the problem presented for solution was that of demonstrating that these men were not affected with pulmonary tuberculosis. Such suspicion was justifiable because more than two-thirds experienced *chronic cough* (this being productive in nearly every instance); in more than half the men *chest pains* were distressing; nearly 40 per cent. of the patients were *losing weight;* 60 per cent. were dyspneic; and in nearly 75 per cent. of the patients *physical weakness* was prominent. The most careful physical examination—before and after diagnostic injections of old tuberculin—together with frequently repeated sputum examinations, observations upon temperature variations, and study of stereoscopic *x*-ray plates, were required before it could be definitely stated that tuberculosis, active or quiescent, did not exist—this, either as a lung or pleural affection independent of the respiratory evidence of gassing or a lesion whose development had occurred as a consequence of lung injury caused by inhalation of gas fumes. Such careful scrutiny of patients as manifested persistent respiratory symptoms did, in fact, result in the discovery of seven patients in whose lungs or pleura rather extensive tuberculous foci existed. These men have not, of course, been included in this study.

One of the interesting and, to the patient, one of the extremely annoying symptoms is the *cough.* This may be more of less constant, but becomes especially severe upon exertion, excitement, or when dust, smoke or fumes are inhaled. It is frequently associated with a dryness of the pharynx and a tickling sensation in the throat. While, in many instances, the cough may arise from a diffuse bronchitis, not infrequently it has its origin in a chronic, diffuse tracheitis or laryngitis, consequent upon general or local epithelial denudation caused by the gas inhalations. Persistent or intermittent hoarseness with concomitant aphonia, may accompany the cough. In a patient of neurotic make-up, this cough, hoarseness or

aphonia, may carelessly be assumed to be of hysterical foundation, and as a consequence of this assumption curative therapeutic procedures may be for a long time delayed. In most of these patients the hoarseness and aphonia are due to persistent or recurrent edema and hyperemia of trachea, larynx, vocal cords and pharynx, these lesions being caused by actual tissue damage from gas.

There is a group of patients in whom *cough is paroxysmal.* It is frequently nocturnal. Not rarely, such cough is associated with marked and even alarming dyspnea—a spasmodic condition closely simulating that present in asthma, whooping-cough, persistent thymus, pressure from aneurysm, or the presence of a foreign body in the larynx, trachea or a major bronchus. With the cough, chest pains may be experienced. These are frequently local, although in different attacks of spasmodic coughing, the location of these chest pains may vary widely. From our knowledge of the pathologic changes in the lungs, produced by gas, it would seem that the paroxysmal cough is dependent mainly upon spasm of bronchi, plugging of bronchi with exudate, local ulcerations in the air passages, pulmonary atelectasis, infarction or irritation of the pleura—particularly its diaphragmatic section. Nocturnal, paroxysmal cough is a factor of considerable significance with respect to malnourishment of lately gassed patients. It prevents sleep and, if long continued, is a potent influence toward developing uncalled-for apprehension and pessimism. The paroxysmal cough and dyspnea are common observations by physicians who have had experience with gassed soldiers, but frequently the therapeutic measures instituted for its control prove that the pathologic alterations in the lung underlying the cough are not fully appreciated. Antispasmodic remedies are very generally prescribed for the relief of these nocturnal spasms, on the supposition that relaxing bronchial spasm will give relief. If the spasm were the only factor in cough production, such remedies would be indicated, but when to *bronchial spasm* are added edema of the lung mucosa and extensive accumulations of exudate, it is evident that something more than antispasmodics is indicated.

Dyspnea.—We have mentioned that at times dyspnea may be associated with pulmonary injury, particularly with parosysmal cough. There is not rarely seen, however, noticeable shortness of breath with cyanosis, that seemingly has its origin in imperfect diaphragm action. In these patients, physical and fluoroscopic studies may demonstrate unequal, uncoordinated or imperfect movements of the diaphragm during inspiration, expiration, or both. At these times we have noted what appears to be actual fixation of the diaphragm. To this type of diaphragm function, particularly if the phenomenon appears spasmodically, there is associated striking respiratory embarrassment. Such a cyanosed patient gasping for breath is a very distressing object. The cause of this type of dyspnea is seemingly due to damage to the pneumogastric and phrenic nerves, either centrally or peripherally. Pulmonary atelectasis or edema, which are not rarely concomitant, cannot fully explain such imperfect diaphragm action and attendant edema, inasmuch as edema and atelectasis are frequently observed to a more marked degree, and yet diaphragm function remains competent and dyspnea is not marked.

Symptoms Referable to the Heart.—Of the 85 patients, 32 complained of some type of cardiac inconvenience. The intensity with which this discomfort impressed itself upon the patient depended considerably upon his psychic make-up. In the apprehensive, emotional type of patient much stress was placed upon *precordial pain.* In 20 of the men such discomfort was the presenting complaint. In 14 patients the distress appeared only on exertion or fatiguing exercises. In the remainder it was constant. The discomfort was variously described as being sharp and knife-like, a fullness, heaviness or choking. The distress was rarely transmitted from the precordia to the upper extremities, from other parts of the chest or to the head. In none of the patients was the pain characteristically anginal.

In 17 individuals troublesome palpitation was associated with precordial discomfort. In 5 patients this was constant. In the remaining 12, palpitation with increase in heart rate occurred commonly upon physical or emotional stress. In 6 individuals, *cardiac irregularity* in these paroxysmal phases became so pronounced as to convey to the patient a sense of impending death from heart failure. In 14 men emotional or physical stress, in addition to producing precordial distress, heart palpitation or irregularity, caused transitory but troublesome *dizziness* or, in 2 cases, actual *fainting*. In this last group of individuals, the psychasthenic state was extreme, the patients being "cardiopaths" of the most pronounced type. These individuals, on careless examination, might readily convey the impression that they were malingerers: they were of the emotional, restless, apprehensive make-up and it was only possible to prove that their complaints were founded upon actual heart anomalies, by repeated observations before during and after physical and mental excitement.

Physical Examination.—*Lungs*.—The writer has already hinted that in gassed patients complaining of cardiorespiratory upsets the symptoms experienced are frequently out of proportion to demonstrable physical anomalies. Particularly is this so in those individuals affected with paroxysmal dyspnea and cough. One may have to repeatedly scrutinize the lungs before, during or following one of these attacks, in order to demonstrate that there exists a physical departure from the normal. Furthermore, the areas of lung involved, as shown by such examination, may be different in numerous attacks. Hasty examinations not uncommonly lead to the conclusion that the patient's respiratory mechanism is in no way imperfect, inasmuch as such examination may occur at a time when the patient is comfortable, or the examination may be incomplete. The condition is not unlike that holding in individuals affected with frequent asthmatic paroxysms—between the paroxysms, lung examination may reveal no cardiorespiratory upset, and yet, in the attack, both pulmonary and circulatory embarrassment are evident and are incapacitating.

In our group of patients *inspection* showed local deficiencies of thoracic expansion in 19. These deficiencies occurred in the upper thoracic zone in but 7; in the remaining cases they were commonly over the lung bases, and in 7 of the 11 instances the left thorax was involved. In 11 patients there were demonstrated areas—frequently shifting on repeated examinations—of increased *tactile fremitus. Altered percussion note,* commonly diminished resonance—rarely so pronounced as to warrant the designation of actual dullness, or flatness—was found in 25 patients. These areas of diminished resonance were not commonly over the lung bases, particularly posteriorly. These zones of altered percussion note and those areas of increased tactile fremitus apparently seemed to be due to closure of the bronchi by exudate, accumulation of cell debris, or to spasm with pulmonary atelectasis. In but 9 instances did it seem that pleural thickening or lung scar (infarct, old pneumonia or exudate) could be responsible for the physical anomalies.

On lung *auscultation,* abnormal respiratory murmurs were demonstrated in 30 patients. These cases consisted of all variations from harsh vesicular breathing to definite bronchial tones. Friction rubs were complicating factors in 2 patients. In 21 instances vocal resonance was abnormal; in 2 there was definite egophony, due to pleural exudate. Râles were constantly or intermittently present in the lungs of 48 men. Emphasis should again be placed upon the intermittance of the demonstration of these râles and also upon the fact that zones of râles may shift in a given patient. In 21 instances râles were generally distributed throughout the lungs. They were commonly dry and musical, rarely moist, sticky or bubbling. In 27 patients, localized but commonly shifting zones of râles were noted. The lung bases were most frequently involved, and it is a curious fact that changes were much more frequent in the left lung than the right.

Physical Signs on Heart Examination.—Before exercises, displaced apex beat—to the left—was observed in 14 patients. In 9 of these the impulse was irregular, forceful and diffuse. In 12 of the patients exercise increased the cardiac displacement and resulted in more noticeable, visible apex impulse. In the remaining 2 instances the heart became smaller, following physical effort. In 12 patients, murmurs due to valvular insufficiency were detected before exercise. In 11 patients the mitral flaps were involved, in 1 the aortic. After exercise, murmurs persisted in these 10 patients and appeared in 15 others whose hearts had indicated competent valves when the patients were under no stress. These facts indicate the necessity for more than the ordinary routine heart auscultation in individuals who have been gassed, before it is possible to be sure that cardiac function is not interfered with.

In 3 patients, arhythmia was persistent and disturbing. It was of no especial type. In 11 patients paroxysmal tachycardia was frequent or subjectively alarming. In 1 instance the heart rate rose above 200. In type, these periods of tachycardia were auricular, apparently auricular fibrillation or flutter being present. In 1 patient—with Wassermann negative—heart-block of the two-one type was observed. It is thus seen that only after effort is it possible to say that intrinsic damage has not been done to the muscle or nerve response of the hearts of gassed patients.

In 14 instances myocardial weakness was pronounced, the muscle tone being barely audible and the systolic pressure not exceeding 96 millimeters of mercury. In this type of patient the exercise response was poor. In 7 of these cases, the systolic pressure was lower following exercise than before, even though the heart rate had increased by one-half. In this class of patient no comment is needed to indicate the reason for physical asthenia and the danger possible upon over-exertion or fatigue. It is this type of individual whose heart efficiency is subnormal on account of deficient myogenic tone, as MacKenzie has emphasized, and who may readily escape being considered as a "heart case" because the general examiner is depending too much upon abnormal valve sounds to inform him respecting cardiac efficiency.

ABSTRACTS
OF CURRENT LITERATURE

CHEMICAL PHYSIOLOGY AND EXPERIMENTAL MEDICINE

ELY, T. C.: Alkali Treatment Applied to the Acidosis of Epidemic Influenza. *New York Medical Journal,* April 5, 1919, cix, No. 14, pp, 573-576.

Acidosis is a constant factor in all infectious fevers. It was found to be especially prominent in the recent influenza epidemic, and was probably responsible, in large measure, for the high fatality of the disease.

Clinical proof of the presence of acidosis was furnished by the peculiar acetone odor of the breath, the dyspnea and air-hunger, and the associated cyanosis, due to withdrawal of the alkali reserve. The therapeutic proof was also convincing. Proper doses of the three basic alkalis, (sodium, potassium and calcium), caused a gradual cessation of the acidosis symptoms.

Other writers corroborate the author's conviction that treatment with alkali bases is the most effective therapeutic procedure. It is known that if the alkalis necessary in the body to neutralize the poison acids are withdrawn or used up, the tissues are destroyed, and life cannot be preserved unless the alkali bases are supplied. "In such a high state of toxemia as epidemic influenza, due to a combination of the most toxic bacteria known, with probably an unknown organism, there is necessarily a high degree of acidosis, and the body bases are soon used up, as the aromatic breath alone indicates."

The author quotes A. Taylor as saying: "As the acids circulate in the system they abstract from the tissues sodium, potassium, and calcium, and disturb the equilibrium of the basic elements in the tissues. Obviously the correct therapeutic measure is not to administer an alkali of one type . . . but a mixture of sodium, potassium and calcium . . . in order to restore the equilibrium."

A free water supply is essential to the osmotic process of combination between the alkali bases of different weights and the poison acids. It is also necessary for the purpose of elimination of the products of this combination, and to prevent alkalosis. The dosage of the alkalis must be carefully calculated, in order to avoid injury to the tissues.

Treatment.—Elimination of the toxic substances is instituted by profuse perspiring, and by divided doses of calomel 1-10 grain (0.006 gram) every half hour, until a grain or more has been given. Water is given freely. Perspiration is induced by drinking large quantities of hot boneset tea, or by hot mustard foot baths and hot water bottles. Sodium bicarbonate, ⅛ ounce, with peppermint water, 4 ounces, teaspoonful every two hours, may be alternated with potassium citrate, ½ ounce, with peppermint water, 4 ounces, teaspoonful every two hours. The calcium salts may be given as lime water, with milk: lime water 1-3, milk 2-3. The author also administers 1 teaspoonful of sodium bicarbonate to a pint of luke-warm water, every four hours, by enema.

In the case of patients who cannot tolerate the potassium salts, the author gives "the sodium bicarbonate mixture every hour and the soda enema as above with a course of calomel 1-10 grain (0.006 gram) with no excipient and codein in small doses."

The cardiac and respiratory stimulants (strychnin, caffein, spartein, digitalis, camphorated oil, oxygen and aromatic spirits of ammonia) may be given in addition to the above.

The flushing of the system through the skin is especially important in view of the increased output of carbon dioxid, which must be eliminated by perspiration. Large amounts of toxin and waste products may also be removed in this manner, and through the kidneys, and the administration of quantities of water is advisable in order to accomplish this purpose.

Opium, morphin or codein, given to relieve the pain in the colic of intestinal influenza, suppress the excretions and delay the elimination of poisonous substances and, consequently, recovery.

The alkali treatment is not only beneficial, but also, without danger to the individual which is not always true of other remedies. Aspirin relieves pain but depresses the heart. Opium checks secretions, as do also atropin and belladonna, even though they stimulate the heart and respiration.

Serum treatment can not be considered effective until the specific organism causing influenza has been definitely isolated. Reinfections occur, proving that attacks of the disease do not produce active immunity. There is, therefore, little hope of obtaining passive immunity by means of serum treatment.

In conclusion the author repeats that the chief cause of death in epidemic influenza is the acidosis. Even the pneumonia would probably not develop if the body bases were not exhausted. This may apply also to nephritis and to cardiac involvement. The aim of the alkali treatment, therefore, is to overcome the acidosis and allow the patient's vital resistance to combat the invading organism.

Griffith, J. P. C.: Acidosis in Children. *The Therapeutic Gazette,* July, 1919, xliii, No. 7, pp. 461-63.

The relative excess of acid in the blood, which constitutes the condition of acidosis, depends upon either over-production of acid bodies, or loss of alkali bases from the body or upon failure of the kidneys and lungs to excrete the surplus acid. The disturbance of balance between alkalis and acids is responsible, not merely the presence of acid.

Acetonuria and acidosis must be distinguished, for acetone bodies are present in the urine of normal healthy children, without symptoms of acidosis being evident. The two conditions may be associated, or may occur entirely independently of each other. Acidosis can only be identified by the occurrence of specific symptoms, or by laboratory tests which reveal a relative excess of acid in the blood and tissues.

Children seem especially subject to acidosis, for reasons not altogether clear. Recurrent vomiting in childhood is often attributed to acidosis, because of the presence of acetone bodies, but the possibility must always be considered that the symptoms are due to starvation.

A prominent cause of acidosis, especially in infancy, is severe diarrhea of a non-inflammatory form, in which there is great loss of liquid from the intestines, as in cases of "milk-poisoning," etc. It is not clear whether the condition is due to retention of acid phosphate, to the presence of lactic acid, to the reduction of the bases, or to some other cause. There is undoubtedly a great loss of alkali in the diarrhea discharge, which may be the principal factor. Acidosis sometimes occurs without discoverable cause. In some cases it is due to nephritis or to pneumonia.

There are few symptoms which may be considered positive evidence of acidosis. Among the early manifestations are restlessness, sleeplessness, and excitement, and later the development of somnolence, prostration, and coma. The only positive evidence, aside from laboratory tests, is hyperpnea, *i. e.*, "exaggerated inspiration and expiration, somewhat increased in rapidity and always pres-

ent." This symptom may be slight or very severe, without there being discoverable involvement of the heart or lungs to account for it.

The prognosis of acidosis is always bad. Once the symptoms are advanced, they may be temporarily abated, but rarely cured.

Treatment should be *preventive,* but unfortunately little is known which will aid in anticipating acidosis. Conditions likely to produce excess of acids should be guarded against. Once the symptoms are apparent, the loss of alkali, as for instance in diarrheal stools, must be checked. Initial purgation in such cases is not only useless but dangerous as well. Alkalis should be administered freely, especially bicarbonate of soda in quantities sufficient to keep the urine alkali. The salt may be given by mouth, bowel, or intravenously. For the latter method the solution must be especially prepared. It should not be boiled, as this reduces it to a carbonate, which is irritating.

In all cases of diarrhea, water must be given in large quantities to replace that which is lost.

Denis, W., and Minot, A. S.: Creatinuria and Acidosis. *Journal of Biological Chemistry,* Feb., 1919, xxxvii, pp. 245-252.

The results of early experiments in the authors' laboratory indicate a close connection between protein intake and the production of creatinuria in man. It was found that in children, in two normal women, and in persons suffering from hyperthyroidism, the amount of creatin present in the urine could be increased or decreased at will by changes in the protein content of the diet.

The authors admit that, while the results of their feeding experiments seem to favor the protein theory, the high protein diets used were highly acid, and the low protein diets consisted largely of alkaline vegetarian foods. Therefore further corroboratory experiments were carried out. The subjects—two normal boys, four women suffering from hyperthyroidism, and two normal women—were fed a highly acid diet, and after creatinin excretion was established, sufficient sodium bicarbonate was administered to keep the urine acid to litmus.

The subjects were given: bread, butter, eggs, milk, cheese, gelatin, one orange, and one apple, in amounts calculated according to the capacity of each individual subject. The sodium bicarbonate was administered in four equal doses, at three hour intervals between 7 a. m. and 7 p. m. Observations of body temperature, made every twelve hours, showed no abnormal figures. Creatinin and creatin determinations were made by Folin's micro-methods, using purified picric acid; the determinations of hydrogen-ion concentrations were made by the calorimetric technic of Henderson and Palmer.

On the whole the results of these experiments seem to demonstrate no definite connection between changes in acid-base equilibrium and creatinin excretion. The wide variations in the daily figures for preformed creatinin and the low figures for preformed creatinin given for adult women would indicate that some of the subjects were perhaps not normal. Other experimenters (Rose, Dimmitt and Bartlett) have failed to find that a high protein diet "induces the excretion of creatinin in normal women and men." But the authors consider that the conditions of these experiments differ from their own to such an extent as to render a comparison of results impossible.

In the experiments which seem to justify the theory that creatinuria could be produced in women by high protein feeding, the daily ration contained approximately 33 grams of nitrogen. The authors have found that in the production of creatinuria by forced protein feeding, the desired result is obtained more slowly if the preceding diet has been of a low protein nature. Two normal women subjects used in earlier experiments were again used. It was found that it took several days of high protein feeding before creatinuria was induced.

The authors urge the necessity for further experimental work with women before a decision can be reached.

LUDEN, G.: Studies on Cholesterol. VI. The Value of Blood Cholesterol Determinations and Their Place in Cancer Research. *The Journal of Laboratory and Clinical Medicine,* Sept., 1919, iv, No. 12, p. 719.

With the exception of Joslin, Rothschild and perhaps a few others, clinicians seem to be under the impression that cholesterol determinations have little or no practical value. The author asserts that her observations over three years of study strongly suggest that tests for cholesterol are of clinical value, although they should not be looked upon as specific diagnostic tests but rather as an aid in diagnosis, like the presence of albumin in the urine, which is of clinical value, even though it does not differentiate cyctitis and nephritis, in the absence of other data.

Apart from the problems connected with cholelithiasis, the cholesterol content of the blood appears to play an important part in growth, both normal and neoplastic. Robertson and Burnett thought that the rate of tumor growth in rabbits could be accelerated by intravenous injection of cholesterol, but that if the cholesterol molecule were changed (by transfusion of "pure" cholesterol into actyl cholesterol or cholesterol chlorid), the tumors would no longer be affected. In this regard it is of importance to know that radium treatment increases the amount of "changed" cholesterol in the blood, while reducing the pure cholesterol.

To understand the mechanism involved in the relation between cholesterol metabolism and malignant growths further observations are needed, but the author emphasizes five points in this connection:

(1) The nature of the test for cholesterol.
(2) The importance of a uniform method for cholesterol determinations.
(3) The source of cholesterol intake.
(4) The factors that influence blood cholesterol.
(5) Practical results to be expected in cancer research from the study of cholesterol metabolism.

Luden attributes much importance to a uniform laboratory technic for the chemical reaction. Some investigators use whole blood; others, blood serum; different color standards are in use, different methods of using the colorimeter, and different temperatures at each determination; there is a difference in the time used to ripen the test, etc.

A detailed account is given of the author's method (quite similar to Bloor's) used in 1,500 determinations, and also of the preparation of a permanent standard, which is suitable, uniform, convenient, and economical.

Cholesterol (C_{27} H_{45} OH) forms a constituent of every mixed diet, being very high in eggs (888 mg. per 100 grams), and moderately high in butter and chicken. Beef contains 63 mg. per 100 grams, milk 28 mg. per 100 c.c. Oatmeal is one of the few foods which contains no cholesterol.

Since cancer patients are shown to have a high blood cholesterol, the value of eliminating foods rich in cholesterol can be seen. For if so much can be done for diabetes by safeguarding the weak spot in their metabolism it is rational at least to try and lighten the task of cholesterol metabolism by dietetic supervision.

The amount of changed cholesterol in the blood is influenced by a number of factors, namely, by radium treatment, by the processes of digestion, by acute bacterial infection, by ulceration and hemorrhage, or by any process which causes body reaction, thus increasing the metabolic rate. It will be remembered that the process of spontaneous regression in malignant tumors is usually accompanied by ulceration, sloughing, or hemorrhage; that radium treatment produces these symptoms, that acute bacterial infection often exerts a curative influence on tumor growth, and that the rate of basal metabolism is manifestly increased in all of these factors.

The author cites several cases to illustrate that the stimulation of the metabolic rate plays an important part in recovery or spontaneous recession of tumors in man, and that

the cholesterol metabolism is influenced directly by increased metabolic rate. The higher the metabolic activity, the lower the pure cholesterol content of the blood. In carcinoma we have not yet been able to recognize the organ which may be chiefly responsible for the type of faulty metabolism that can incite the cells to lawless proliferation. Had the same amount of energy that has been devoted to the study of chemical and metabolic details in diabetes been similarly employed in cancer research, the verdict that "90 per cent of those in whom cancer develops succumb to the disease," might never have been pronounced.

Blood cholesterol determinations, made systematically in conjunction with observations on the rate of basal metabolism, and on other chemical constituents of the blood and urine, as well as the cytology of the blood, might reasonably be expected to advance our knowledge in this direction. It is for the purpose of further study on lipoid metabolism that the determination of blood cholesterol, which is one of the chief blood lipoids, should be given a place in cancer research.

MITCHELL, C.: A Simple Urine Test for Acidosis. *Medical Record,* March 8, 1919, xcv, pp. 404-406.

The acidity of the urine alone is not to be depended upon as a sure diagnostic sign of acidosis, nor is the presence of acetone bodies, nor a chemical reaction to ferric chlorid, as these reactions may be caused by other, non-specific, factors.

The busy practioner requires, most of all, a simple, trustworthy urine test which may be carried out without special apparatus and chemicals difficult to obtain. The author therefore suggests an iodin test, based upon the fact that urine has the property of decolorizing iodin in aqueous solution, *i. e.,* iodin in solution in potassium iodid, as in the so-called Lugol's solution. It has been found that the urine of diabetic coma and of the pernicious vomiting of pregnancy have a decolorizing power on iodin greater than that of other conditions. Evidently the urine in the acidosis of diabetes and of pregnancy contains a substance which is particularly destructive to the yellow color of iodin.

The technic of the test is as follows: To 145 c.c. of water are added 3 c.c. of Lugol's solution and 2 c.c. of a saturated solution of picric acid, the whole being thoroughly mixed. The result is a clear, bright reddish liquid. This is poured into a white dish and heated until fumes are abundantly given off. The author heats it in a water bath to 180° F., (82.22° C.), but a flame will suffice. The liquid must not be allowed to boil. To the hot liquid the urine is added quickly, but in small amounts, from a graduated buret or graduated bottle. It will be found that in acidosis the amount of urine needed to change the bright red color to a bright yellow color is small, and the smaller the amount required, the worse the case. In severe cases 2 or 3 c.c. of urine will immediately change the color, in moderate cases 8 or 10 c.c. are required, while normal urines in smaller amounts than 15 c.c. do not usually affect the color. In doubtful cases it is advisable to have near by, for purposes of comparison, another white dish containing about 150 c.c. of saturated picric acid solution.

The urine should be tested daily, and thus the progress of the disease may be controlled. If day by day the color is changed by less and less urine, the case is growing more severe. Conversely, if the amount of urine required increases from day to day, the patient may be considered on the road to recovery.

The test may be made with cold solution by timing. To a given amount of liquid is added a smaller amount of urine, and the time in seconds, minutes, or hours required for the change in color compared with the time required for an equal amount of normal urine to effect the change. However, the author prefers the method in which the liquid is heated, as being more trustworthy and rapid.

Bruce, W. J.: A Simple Method for Determining the Reaction of the Feces. *The Journal of Laboratory and Clinical Medicine,* Oct., 1919, v, No. 1, p. 61.

Prepare a 1 per cent solution of alizarin. Place two small drops of the indicator on a glass slide about 1½ inches apart. Dip a glass stirring rod into the liquid part of the specimen (or if the feces is formed merely puncture the mass). Mix thoroughly in one of the drops, using the other drop as a control. An alkaline reaction is indicated by a reddish violet to violet color, neutral by no change, and acid by a light yellow color.

Emerson, C.: The Preservative for Wassermann Reagents (Chloroform the Best Preservative). *The Journal of Laboratory and Clinical Medicine,* Oct., 1919, v, No. 1, p. 62.

The alcohol extract of antigen keeps indefinitely. Red blood-cells may be serviceable up to one week after collecting if sedimented in salt solution and kept in the ice-box. Complementary serum must not be over four days old and must be kept in the ice-box. The amboceptor, suspected sera, and control sera are much better preserved and are active for a greater period of time if a few drops of chloroform are added as a preservative. No test is of certain value if performed on sera kept in contact with the clot longer than twenty-four hours.

Reimann, S. P.: The Acid-base Regulatory Mechanism in Anesthesia. *American Journal of Surgery. Anesthesia Supplement,* July, 1919, xxxiii, No. 7, pp. 86-89.

There is an increase in acids in every patient anesthetized by ether, chloroform, and nitrous oxid. In the average surgical patient, however, the alkali reserve is not drained, so that acidosis, if present, is compensated. The reduction of bicarbonate, found to occur after anesthesia and operation, seldom reduces the amount of carbon dioxid below 50 c.c., the normal being from 60 to 75 c.c. The reduction in carbon dioxid is largely due to an increase in organic acids, especially acetone, diacetic acid, and B-hydroxybutyric acid, in the blood. It has been proven that these ketones are increased after anesthesia, due to the partial or incomplete oxidation known to occur during this condition.

"Interference with oxidation is so intimately associated with the anesthetic agent that to prevent suboxidation is to prevent anesthesia. Therefore, to prevent excess acid formation is to prevent anesthesia." The protection of the patient against acidosis must consist in supplying the body with alkali.

The symptoms produced by the acidosis vary with the severity of the condition from mild headache and general mental dullness to coma and death. Uncompensated acidosis usually occurs as an accompaniment of some grave pathological condition, and it is difficult to estimate the relative importance of the respective conditions in producing symptoms. Individual differences may affect the reactions to operative treatment.

In many cases of unfavorable postoperative symptomatology the administration of plenty of water with alkali led to a remarkable change for the better, thus proving the acidotic nature of the symptoms.

Impaired kidney function is definitely a factor in the production of uncompensated acidosis, due to the failure of the organism to excrete acid substances. The duration of anesthesia is also a factor. The longer suboxidation is allowed to proceed, the greater in the demand for reserve alkali. The preoperative alkali reserve of the patient has also some bearing on the production of acidosis under anesthesia. Therefore, it has been recommended that carbon dioxid be given with the anesthetic, to replace that lost during suboxidation. However, the author does not find this method logical. He recommends instead that estimations of the carbon dioxid content of the blood-plasma be frequently made, and, if indicated, alkali (sodium bicarbonate) be given accordingly.

Frequent tests should be made to determine whether the alkali is sufficient or excessive. In this manner the acidosis may be affectively controlled.

KAPLAN, DAVIDS: Syphilis and Its Serological Significance. *New York Medical Journal*, December 13, 1919, cx, No. 24, p. 969.

In his introductory remarks to the article, Kaplan emphasizes the importance of cooperation between the clinician and the laboratory man, in studying the clinical side of syphilis, and the necessity not only of taking into consideration the patient's antecedents, but also of having an eye for the future, thus possibly preventing the ravages of the disease. The correct interpretation of the various manifestations of visceral syphilis requires much more study and care than does that of the less difficult forms of syphilis of the skin and osseous system. Lues of the cardiovascular system may cause more serious trouble when improperly handled than syphilis of any other part of the body, with the exception of neurosyphilis.

As a result of the author's experience he is prepared to state that a positive Wassermann reaction is sometimes obtained in cases without lues which ultimately show no trace of this infection at postmortem, and also that in some cases of syphilis salvarsan is at times contra-indicated, regardless of the presence of lues, and of a positive Wassermann reaction. He has seen instances where the heroic use of salvarsan could be held directly responsible for the patient's death. According to him it is the duty of every one who treats syphilis to note the degree of involvement, to carefully determine the amount of improvement possible without attempting to administer salvarsan or anything else *ad libitum*, and not to depend upon the serologist to indicate when the treatment is to be stopped.

Another factor requiring caution, a good clinical sense and the careful selection of the antiluetic treatment, is the individual susceptibility of the patient. Salvarsan should be given with extreme care to individuals with low blood-pressure, as arsenic tends to lower vascular tone. Exceptionally, one encounters patients who can tolerate enormous doses of salvarsan without any manifestation of chronic arsenical poisoning. In Dr. Kaplan's opinion, the practice of the adherents of the intensive method of treatment, with salvarsan, especially in neurosyphilis, is not a wise one, as equally good results may be obtained, and are actually secured, with smaller doses at rarer intervals. He questions the good judgement of physicians who give from 20 to 30 injections of salvarsan in from thirty to forty days, regardless of the patient's subjective good health, waiting only for a negative serological report.

The persistence or intensity of a positive Wassermann reaction, and for that matter its disappearance, are not in his opinion criteria for continuing or discontinuing antiluetic treatment. He bases his opinion on the following facts: (1) In early and in some late syphilitics there is a corresponding diminution in the intensity of the positive Wassermann reaction. (2) In the present state of our knowledge, no one can be sure whether the phenomenon of a positive Wassermann reaction as an index to antibody-formation is not nature's method of combating the malady. (3) Certain diseases, such as scleroderma, leprosy, hepatic disease (chronic plumbism—Abstr.), etc., which are not even remotely associated with lues, and in which lues can definitely be excluded antemortem and postmortem, repeatedly give a positive Wassermann reaction. In view of these facts he doubts the wisdom of pushing intensive antiluetic treatment in case of general improvement of the symptoms of lues, merely because the Wasserman tests remain persistently positive.

To practice neurology today without laboratory aid is almost impossible, but the author says that the laboratory physician "should have had a thorough and extensive clinical experience before he submits clinical opinions." The laboratory not infrequently reveals evidences of a pathognomonic nature which in some cases are the only

signs available. Until recently the men using the intraspinous method of treatment of neurosyphilis championed this method simply because the cells in the cerebrospinal fluid from patients thus treated disappear with phenomenal rapidity. This claim, in view of our present experiences, is not justified, because pleocytosis is no longer considered to be an index of the presence or absence of lues, but merely shows that somewhere in the central nervous system the vascular membranes are in contact with some irritant, which need not necessarily be the spirochete. The reason for the rapid subjective and even objective relief after lumbar puncture lies in the fact that the nervous structures respond much more readily to the slightest kind of stimuli, and that when the pressure produced by an exudate is partially removed, the sensory apparatus responds at once. The relief from pain following lumbar puncture is especially marked in cases of posterior root irritation and in the hyperlymphocytic types of tabes. The proportion of polynuclear elements, according to Kaplan, plays a secondary rôle merely and is to be utilized merely as an additional feature of good prognostic omen. Polynuclear leukocytosis usually accompanies recent acute exudates and rarely exceeds 10 per cent of the total cell-count, where the total number of cells to the cu. mm. is less than 100.

Under treatment, these polynuclear cells are the first to disappear in neurosyphilis, and with them the lymphocytes diminish to about half of the previous count. It is curious, but nevertheless true, that the smaller the original cell exudate the more difficult it is to bring about a normal cell-count in the cerebrospinal fluid. An important exception to the removal of pleocytosis by lumbar puncture is found in syphilitic meningitis, namely, that the severer the meningitis, and therefore the pleocytic exudate, the more rapid and far-reaching the results of treatment, both from a serological and from a clinical point of view.

As a rule an excess of globulin is accompanied by a pleocytosis, except: (1) in cases where local pressure from tumors or diseased bone conditions interferes with the proper function of the cord, (2) in cases of combined sclerosis of the cord, and in disease of the blood-vessels of the conus medullaris, as described by Elsberg and Kennedy. As to the origin of the globulin excesses in these conditions, nothing more is known than of their origin in syphilis, *i. e.,* that they are due to meningeal activities. In other words, they are hematogenous in origin.

Another important phenomenon in the serology of the nervous system is the colloidal gold test in the spinal fluid, and here the author emphasizes the fact that this test, whether positive or negative, does not establish or exclude the presence of syphilis. A negative colloidal gold reaction establishes the absence of general paresis.

Of course, inasmuch as paresis is due to syphilis, its presence is confirmed by the colloidal gold curve. In this connection, Kaplan insists that he is opposed to the intraspinal or intradural methods of treating paretics. He says, "One should always bear in mind that they cannot be brought to normal in so far as the focal disease is concerned, and the most one can accomplish is a more or less durable period of lucidity, and for the time being, so to say, to extricate the patient from the class of antisocial beings. The prognosis is always bad, and the doctor who defers the period of decline is rendering all the assistance he can offer from the present therapeutic methods."

Laroche, G., et Virmeaux: Recherche du Bacille de Koch, par Homogeneisation des Crachats sans Centrifugation. *Comptes rendus des Seances de la Societe de Biologie,* Nov. 16, 1918, lxxxi, No. 21, pp. 1,085-6.

A long process of centrifugation is absolutely necessary in order to obtain good results in searching for Koch's bacillus by homogenization of the sputum. The methods which some laboratories employ in collecting bacilli without centrifugation give inaccurate results, because they do not take into

consideration the density of the liquid of homogenization.

The author recommends a method which he has found to give accurate results.

(1) Homogenize with a sodium solution, according to the technic of Bezancon et Philibert, *i. e.,* by taking ten times as much liquid as sputum. Put the sputum and one-half the water in a porcelain container, add as many drops of sodium solution as there are c.c. of sputum, add the rest of the liquid gradually, and heat slightly for ten minutes.

(2) Add sodium chlorid, chemically pure, 3.35 grains (0.25 gram) per c.c. of the mixture. Shake until the chlorid is completely dissolved.

(3) Pour the liquid into a tube, cool, and add a few drops of ether and ligroin in equal parts. Shake well, keeping the finger protected.

(4) Let stand for six hours to allow the bacilli to collect.

(5) Remove the bacilli which have collected in the ligroin, with a platinum wire or a pipet. Spread on a slide, dry and fix over an alcohol flame.

(6) Wash the slide in distilled water until the precipitated chlorid is dissolved.

(7) Stain the Koch bacilli by the technic of Benzancon and Philibert.

The greatest density of the homogenized and chloruretted liquid is approximately, 1,142, whereas that of the Koch bacillus varies from 1,010 to 1,080.

This method, by eliminating the possibility of error due to the variability of the liquids of the homogenized sputum, gives accurate results comparable to those obtained by the centrifugation method, and may therefore be used in laboratories which do not possess a turbine.

KAHN, M. H.: The Position of the Arm in Blood-pressure Measurements. *American Journal of Medical Sciences,* Dec., 1919, clviii, No. 6, p. 823.

In men between twenty and thirty there is a change in blood-pressure, both in normal and abnormal conditions, when the arm is raised from the side of the body, whether the subject is sitting, standing, or recumbent. Graphic curves are given to show the diagnostic importance. In normal cases the curve shows a progressive fall of the systolic and diastolic pressures as the arm is raised. At 45 degrees elevation the pressure falls 8 mm. of mercury; it falls 6 mm. more with elevation of 90 degrees, 14 mm. more at 135 degrees, and 25 mm. more with the arm vertical. The diastolic pressure corresponds, but is slightly less. In effort syndrome cases the fall is more marked: 15 mm. with elevation of 90 degrees, and 52 mm. with the arm at 180 degrees elevation. The diastolic pressure is slightly less. In thyro-etoxic cases and exophthalmic goiter the total systolic loss with the arm at 180 degrees averaged 84 mm., the diastolic 52 mm. in cases of nephritic hypertension the pressure yields little. It falls 9 mm. at 45 degrees of elevation, 6 mm. more with the arm at 90 degrees, 6 more with elevation of 135, and only 2 mm. more with the arm at 180 degrees. In aortic regurgitation the diastolic pressure falls more steeply and more promptly than the systolic. Its maximum fall occurs at 90 degrees elevation and remains there to an elevation of 180 degrees.

MCMAHON, T.: Studies of Cases of "Effort Syndrome" With Measured Work. *American Journal of Medical Sciences,* Dec., 1919,, clviii, No. 6, p. 818.

At General Hospital No. 9, a study was made of the changes in pulse-rate and blood-pressure in 50 cases of effort syndrome and on 11 normal cases after fatiguing the subjects with hard exercise. The former cases did less work, the pulse-rate was higher at rest, and there was no delayed rise of blood-pressure suggesting myocardial insufficiency. Under-nourished and poorly developed skeletal muscles, determined by tests, must be considered in the study of the causes of fatigue following slight exertion.

Adams, F. D., and Sturgis, C. C.: Note on the Vital Capacity of the Lungs and the Carbon-dioxid combining Capacity of the Blood in Cases of "Effort Syndrome." *American Journal of Medical Sciences,* Dec., 1919, clviii, No. 6, p. 816.

A study is given of 100 cases of effort syndrome at Base Hospital 9, Lakewood. The constant complaint was shortness of breath on slight exertion. The conclusion was that the dyspnea was not dependant upon diminished vital capacity of the lungs. The chemical content of the blood fell within normal limits in all instances.

Alvarez, W. C.: Recent Advances in Gastric Physiology. *American Journal of Medical Sciences,* Nov., 1919, clviii, No. 5, p. 609.

Experiments with sections of stomach taken from animals and executed criminals show a graded rhythmic character of the gastric wall downward, likened to a pacemaker of the heart with much slower waves. The most rhythmic muscle is along the lesser curvature. Small strips of muscle from different parts of the stomach, immersed in warm, aerated Locke's solution were used. The most sensitive parts, with the most pronounced tendency to rhythmic contraction, were from the lesser curvature near the cardia. The slowest to respond came from the greater curvature, from the pyloric antrum. The amplitude of contraction was found to be smallest near the cardia, and largest in the antrum. There is a gradient of irritability from the cardia to the pylorus. The latent period is shortest near the cardia and longest in the pyloric antrum. The muscle in the cardia is more delicate and will not react so well after trauma. The antral muscle is much tougher and will react after trauma. After stimulation the fundus muscle remains tonically contracted, while the antral muscle promptly relaxes. The duodenum was found to be more irritable than the antrum, and its rhythmic rate higher. In accordance with this there was a regional difference in chemical structure, and in rate of metabolism. Attention is drawn to the fact that only a few bundles of longitudinal connective tissue pass over between the antrum and the duodenum; thus the visible gastric waves are not carried over. There is a gradient of metabolism underlying and perhaps giving rise to the gradients of irritability, latent period, and rhythmicity which it is believed determine the direction of peristalsis. The metabolic gradient is often found to be reversed in sick animals which refuse food. The lowest values in the entire digestive tract are in the antrum, and this may explain the many instances of cancer which occur in that region, and the inability of tumors to cross into the duodenum, where the metabolic rate is very high. In ulcer of the lesser curvature a sleeve resection is found to give better functional results than a V-shaped excision.

Kraabe, K. H.: Nyere Undersolgen over den disseminerede Skleroses Aetiologi. *Ugeskrift for Læger,* Nov. 7, 1918, 80 aargang, No. 45, p. 1,772.

The author gives a general view of the relatively few works which exist on experimental examinations to determine the etiology of disseminated sclerosis, *i. e.,* the examinations of Bullock, Ceni and Besta, Jurgens, Siemerling and Raecke, Simons, Steiner and Kuhn. The results are contradictory, and none of them prove that disseminated sclerosis is an infectious disease. The author himself has made a few inoculations of spinal fluid from patients with disseminated sclerosis in monkeys (macaque) and rabbits; the results were negative. In spite of these negative results he considers that it is most probable that disseminated sclerosis is infectious, and suggests that long series of inoculations from acute stages of disseminated sclerosis perhaps would give positive results.

Douglas, B.: The Reaction of the Leukocytes in Epidemic Influenza. *Bulletin of the Johns Hopkins Hospital,* Nov., 1919, xxx, No. 345, p. 338.

From a study of the leukocyte-counts in a large number of cases of influenza during the recent epidemic, the author concludes that leukopenia is the rule in epidemic influenza, although a few cases may show normal counts or a slight leukocytosis. The leukopenia is frequently present on the first day of the disease, after which it may become more marked for a few days, with a subsequent tendency to rise gradually until the normal mark is reached. In some cases the normal mark is overshot during convalescence, and leukocytosis may be present. There is no constant relation between the leukocyte-count and the severity of the disease. Persistance of the leukopenia is the rule, even when bronchopneumonia, fatal or non-fatal, supervenes. Differential counts show a relative and absolute decrease in the polymorphonuclear cells. Acute non-influenzal respiratory infections are, as a rule, accompanied by a leukocytosis. A leukopenia is, therefore, a reliable diagnostic sign in epidemic influenza.

Mann, F. C.: A Study of the Tonicity of the Sphincter at the Duodenal End of the Common Bile-duct. (With special reference to animals without gall-bladders). *Journal of Laboratory and Clinical Medicine,* Nov., 1919, v, No. 2, p. 107.

The article deals with a comparison of the tone of the sphincter in animals with gall-bladders as compared with those without. Mann's work showed that in animals possessing gall-bladders the sphincter was usually able to withstand a minimum pressure of from 75 to 100 mm. water, while in those animals which lacked gall-bladders the sphincter would withstand pressures of less than 30 mm. water only. Both species were shown anatomically to have a sphincter, but in those animals which did not have gall-bladders the sphincter, does not seem to have functionated appreciably.

Previous work on the function of the gall-bladder has shown that cholecystectomy is usually followed by dilatation of all the extrahepatic ducts, thus implying that there is some relation between the action of the sphincter and that of the gall-bladder.

Wiggers, C. J.: Factors Determining the Relative Intensity of the Heart-Sounds in Different Auscultation Areas. *Archives of Internal Medicine,* Nov. 15, 1919, xxiv, No. 5, p. 471.

From an experimental study on dogs, using recording capsules devised by Dean and the author, Wiggers was able to demonstrate the relation of certain factors to the intensity of the heart-sounds. Changes in the intensity of any heart-sound over a particular area were determined by comparing the amplitude and number of vibrations entering into that sound complex before and after modified conditions of the circulation were experimentally produced. It was found that the intensity of the first sound is not related to the volume of blood discharged by the ventricles, *e. g.,* during the slowing of the heart; when the systolic discharge is increased, the first sound is reduced in intensity of the first sound over all regions varies directly as the systolic tension develops within the ventricles. The intensity of the second sound increases or decreases with the pressure (aortic or pulmonary) at the beginning of diastole. In the case of the injection of pituitary extract, which increases the pressure in the systemic circuit, and decreases the pressure in the pulmonary circuit, there was an increase in the intensity of the first sound at the apex and of the second sound in the aortic area, and a diminution of the second sound in the pulmonic area. The author concludes that with the exercise of reserve and caution, a change in the intensity of the first sound over any area may be taken as strong evidence of a change in tension developed during systole of the ventricles,

while a change in intensity of the second sound over the aortic and pulmonary areas may be safely used as an index of a change of pressure at the beginning of diastole in the greater and lesser circuits, respectively.

GATES, F. M.: A Method of Standardizing Bacterial Suspensions. *The Journal of Experimental Medicine,* Jan. 1, 1920, xxxi, No. 1, p. 105.

The opacity of a bacterial emulsion is measured by the length of the column of the suspension required to cause the disappearance of a wire loop. By a simple formula the measured opacity is translated into terms of the concentration of bacteria per c.c., and so made comparable with that of other suspensions of the same organisms. An instrument for measuring the opacity of bacterial suspensions is described in detail.

PAPPENHEIMER, A. M., AND VANCE, M.: The Effects of Intravenous Injections of Dichlorethylsulfid in Rabbits, with Special Reference to Its Leukotoxic Action. *The Journal of Experimental Medicine,* Jan. 1, 1920, xxxi, No. 1, p. 71.

There is evidence pointing toward the general toxicity of dichlorethylsulfid (mustard gas), both when administered by inhalation and when injected subcutaneously or intravenously. An emulsion was prepared in 30 per cent. alcohol in distilled water. This suspension was prepared from recently made, accurately weighed, 10 per cent solution in absolute alcohol, and immediately injected to avoid hydrolysis. The dichlorethylsulfid was a distillate from the contents of a German yellow cross shell, and was actively vesicant.

The lethal dose of dichlorethylsulfid injected intravenously into rabbits was found to be from 1-12 to 1-6 grain (from 0.005 to 0.01 gram) per kilo. Rabbits dying within twenty-four hours showed extensive hemorrhages and edema of the lungs. About one-third of the rabbits showed severe lesions of the intestinal tract. Injected intravenously, the drug was specifically poisonous for the hematopoietic tissues. Severe lesions were caused in the bone-marrow, and the number of circulating leukocytes was markedly diminished. In animals surviving the injection regeneration occurred. The granular cells of the bone-marrow seemed to be more sensitive than the lymphoid cells or than the erythrocytes. The effect upon the blood and hematopoietic tissues was not due to the admixture of nitrobenzene or chlorobenzene in the shell filling, as injection of these substances in amounts many times greater than the total dose of dichlorethylsulfid used produced no changes in the blood picture, and the subsequent injection of dichlorethylsulfid free from these solvents produced a typical reaction.

EBELING, A. H.: A Strain of Connective Tissue Seven Years Old. *The Journal of Experimental Medicine,* Dec. 1, 1919, xxx, No. 6, p. 531.

In July, 1914, Dr. Carrell reported the condition of a strain of connective tissue twenty-eight months old, isolated from a fragment of heart extirpated from a chick embryo on January 17, 1912. To-day this strain is still alive. It has been under cultivation *in vitro* for a period of over seven years and has undergone 1,390 passages.

The purpose of this article is to describe the technic employed in perpetuating the strain during the last five years and in measuring the increase of the tissue, the factors which influence the rate of growth, and the present condition of the strain.

The author goes into detail with regard to the technic used, and indicates the factors which influence the rate of growth. He also describes the present condition of this strain of connective tissue.

The medium used for perpetuating this strain is composed of equal volumes of chicken plasma and chick embryo extract, which combination produces a clot, which is firm

but not dense enough to interfere with the migration of the cells.

The author concludes by saying that the connective tissue cells appear to have the same power of multiplying indefinitely in culture medium, as do microorganisms.

BERMAN, L.: The Determination of Hemoglobin by the Acid Hematin Method. *Archives of Internal Medicine,* Nov. 15, 1919, xxiv, No. 5, p. 553.

The author shows that the method of Sahli does not furnish accurate determination of hemoglobin within from 15 to 20 per cent. The method of the author consists in using N/10 HCl as a dilutent as well as for the immediate reception of the blood, boiling for one minute, and taking the reading after it has been allowed to cool for one minute, then diluting as before with N/10 HCl. Determinations made by this method were found to correspond very closely with hemoglobin determinations calculated from the iron content of the blood.

YOUNG, H. C., AND GIVLER, J. P.: A Comparison of Certain Antigens Used in the Complement-fixation Tests of Pulmonary Tuberculosis. *The American Review of Tuberculosis,* Oct., 1919, iii, No. 8, p. 476.

There are innumerable points that might be and have been discussed in connection with complement-fixation for tuberculosis, the technic, and especially the antigens. The technic needs little comment, as it has been fully discussed by able investigators, and precautions have been clearly pointed out. Without any conception of the chemistry of the tubercle bacillus bacillary emulsions have been suggested a number of times and their value as antigens extolled, but their advantages over a simple bacillary emulsion have not been made clear. In this class is the Wilson antigen. The alcoholic extraction removes both the fatty and the protein extractives, and since this extraction is crude, at best, it is natural that antigenic material should remain with the bacilli. Complete extraction, however, removes all antigenic substances, as expected. We are arriving at a point where a new antigen should have a scientific basis to justify its introduction.

The following results were obtained with the serums of 97 clinically normal individuals, 37 questionably tuberculous, 84 incipient, 75 moderately advanced, and 31 far advanced cases of pulmonary tuberculosis, using for comparison the autolysate antigen of Corper, the methyl alcohol soluble antigen of Petroff and the Wilson bacillary emulsion:

The three antigens did not differ greatly in the percentage of positive findings from that in known cases of pulmonary tuberculosis, Petroff's antigen giving 66 per cent, the autolysate antigen, 63 per cent, and Wilson's antigen, 57 per cent, the last being the least efficient of the three.

The percentage of positive findings obtained in the various classes of case by the three antigens were: 11 per cent of the clinically normal individuals, 58 per cent of the questionably tuberculous, 56 per cent of the incipient, 64 per cent (66 per cent sputum positive cases) of the moderately advanced, and 71 per cent of the far advanced cases. Moribund cases have a lower percentage positive, (44 per cent), than any other of the definitely positive cases of tuberculosis, corroborating the findings of previous investigators.

A fairly high percentage of serologically positive luetic serums (from 50 to 60 per cent) gave cross fixation with the three tuberculous antigens. The serum of only 1 out of 7 guinea pigs (of a total of 75) obtained on the market proved unsuitable for complement-fixation tests for syphilis and tuberculosis, corroborating the findings of the earlier investigators, and not bearing out Von Wedel's contention. The human hemolytic system is superior to the sheep system as ordinarily used in testing serums from cases of pulmonary tuberculosis. The native sheep hemolysins in the serum deteriorate to a great extent in a week.

Upham, R., and Higley, H. A.: A Study of the Renal Concentration Power for Uric Acid in Early Chronic Interstitial Nephritis. *Archives of Internal Medicine,* Nov. 15, 1919, xxiv, No. 5, p. 557.

The authors compared the concentration of the uric acid in the urine with that in the blood in patients on a standard test diet. A figure was obtained by dividing the amount of urine uric acid (expressed in mg. per 100 c.c.) by the amount of blood uric acid. In a group of known nephritics this figure was found to be 14, or below, in every case. While in a group of non-nephritics it was 20, or above, in every case. In a group of doubtful cases which the authors suspected of being nearly nephritis cases, the figure was below 18.4 in every case.

Olitsky, P. K., and Kligler, I. L.: Toxins and Antitoxins of Bacillus Dysenteriæ Shiga. *The Journal of Experimental Medicine,* Jan. 1, 1920, xxxi, No. 1, p. 19.

Studies of the toxic products yielded by the Shiga bacillus led to the conclusion that this organism growing *in vitro* produces two poisons, one an endotoxin, and the other an exotoxin, which can be separated experimentally and can also be shown to attack different anatomical structures of the rabbit and to set up two distinct kinds of pathologic effects.

Shiga first pointed out that the bacillus is highly toxic for the rabbit, and this animal has remained the chief one for experimental study of the organism. The bacillus—or its poisonous products—produces lesions in the intestines and also in the central nervous system. The intestinal lesions consist of greatly thickened, inflammatory, edematous large intestine, the mucous membrane of which is yellowish white, more or less hemorrhage being present. The central nervous system is usually the seat of serious lesions, which may occur at any portion of the system, although the medulla is most often affected. The gray matter—and almost exclusively the anterior horns—shows chromatolysis of the neurons to a varying degree. The white matter is intact. The lesion is that of an acute myelitis, often of anterior poliomyelitis, and sometimes, of polioencephalitis.

The exotoxin was prepared as follows: Plain meat infusion broth was mixed with 1-3 volume of 10 per cent egg albumen. The latter was prepared by adding 1 volume of egg white to 9 volumes of distilled water. The mixture was pH 7.6 to 7.8 and was autoclaved for 45 minutes at a pressure of 15 lbs. The medium was inoculated with one-half an agar slant of a twenty-four hour culture of Shiga bacillus and incubated at 37° C. During the incubation the contents of the flasks were shaken from time to time, to increase aeration. After five days the culture fluid was filtered through a Berkefeld N candle. The filtrate constituted the exotoxin.

The endotoxin was prepared as follows: Shiga bacilli were grown in Blake bottles for twenty-four hours. The growth was washed off in saline solution, 15 c.c. to each bottle, incubated for two days at 37° C. and filtered through a Berkefeld N candle, the exotoxin being destroyed by either exotoxic serum or by heat.

The study of the nature and effects of the poison of this microorganism is thus simplified. The two toxins are physically and biologically distinct, the exotoxin being relatively heat-labile, rising in an early period of growth, and yielding an anti-exotoxic-immune serum. The endotoxin, on the other hand, is heat-stable, is formed in the latter period of growth, and is not neutralized by the anti-exotoxic serum. The exotoxin exhibits a specific affinity for the central nervous organs in the rabbit, giving rise to a characteristic lesion—mainly, necrosis, hemorrhage, and possibly a perivascular infiltration in the gray matter of the upper spinal cord and the medulla. The endotoxin exerts a typical action on the intestinal tract, producing edema, hemorrhages, necrosis, and ulcerations in the large intestines. In dysentery in man intestinal lesions predominate, but in severe epidemics paralysis and neu-

ritis have been observed. These facts become especially significant from the standpoint of the serum therapy of bacillary dysentery. A potent anti-dysenteric serum should contain antibodies against the exotoxin as well as against the endotoxin. That such a serum can be produced in horses has been experimentally demonstrated.

Langstroth, L.: Blood Viscosity. I. Conditions Affecting the Viscosity of Blood After Withdrawal from the Body. II. Effect of Increased Venous Pressure. *The Journal of Experimental Medicine.* Dec. 1, 1919, xxx, No. 6, pp. 597, 607.

I. The viscosity was measured by the viscosimeter of Determann, which required only 0.2 c.c. of blood for a determination. Readings were made at 20° C., with a stop-watch recording 0.001 minute. Coagulation was prevented by wetting the inside of the syringe with a saturated solution of oxalate.

Small amounts of potassium oxalate have practically no effect upon the viscosity, and the changes ascribed to it may be attributed to variations in the carbon dioxide content, or to sedimentation of the red blood-cells. Exposure to air rapidly increases the viscosity due to the loss of carbon dioxid. It is important, in determining viscosity, that the red-cells should be uniformly suspended by rotating 5 or 10 c.c. of blood in a separating funnel for one minute.

II. A rise in venous pressure caused by the application of a loose binder to the arm results in a marked increase in the viscosity of the whole blood. This is primarily due to a concentration of the blood in the capillaries. This concentration is shown by an increase in the viscosity and total nitrogen of the plasma, an increase in the relative volume of the red blood-cells, and an increase in the relative percentage of hemoglobin. Changes in viscosity of the whole blood following venous stasis apparently bear no demonstrable relation to the carbon dioxid or oxygen content.

Murphy, J. B., and Nakahara, W.: The Lymphocyte in Natural and Induced Resistance to Transplanted Cancer. A Histological Study of the Lymphoid Tissues of Mice with Induced Immunity to Transplanted Cancer. *Journal of Experimental Medicine,* Jan. 1, 1920, xxxi, No. 1, p. 1.

Of the theories brought forward to explain the natural and induced resistance of mice to transplanted cancers, the theory of Da Fano was the first to call attention to the lymphocyte as a possible active agent in cancer immunity. He noted the fact that not only was there an increase in the number of lymphocytes about the graft in resistant animals, but also an increase in the number of these cells in the subcutaneous tissues.

In the work presented in this paper a study has been made of the lymphoid organs in animals with induced immunity to cancer, in order to establish a further link in the evidence associating the lymphocyte with cancer immunity, and to ascertain if possible the source and nature of the blood lymphocytosis. In the course of the experiments a histological examination was made of the changes in the subcutaneous tissue in order to check and possibly extend the earlier observations of Da Fano.

The experiments were conducted upon 100 mice. Adenocarcinoma bits No. 63 (Bashford) were used for inoculation. All the mice used in the experiments were of the same stock and of about the same weight. The virulence of the tumors used in each experiment was tested by inoculation into a number of normal mice.

Defibrinated mouse blood was used to induce immunity, being administered subcutaneously and, in some cases, intraperitoneally. Observations were made of the effect upon the spleen, lymph-glands, the circulating lymphocytes, the subcutaneous connective tissue, the thymus, the thyroid, the liver, kidneys, and bone-marrow.

The mice immunized against cancer as described show in the germinal centers of the lymphoid organs a marked increase in the number of mitotic figures. The increase be-

comes evident forty-eight hours after injection, in the majority of instances, and reaches its climax on about the fifth day. After this time it subsides, returning to the normal rate on about the tenth day.

These immunized animals, when inoculated with a cancer graft ten days after the injection, show a second stimulation of the lymphoid centers similar to the first but more intense in character. The increase in the number of mitotic figures becomes evident as early as twenty-four hours after the cancer inoculation, and persists to a marked degree for a week, after which there is a gradual return to the normal rate.

The lymphocytes of the circulating blood during the establishment of the immunity show frequent examples of amitotic division, and many examples of irregular and lobulated nuclei. These changes suggest intensified functional activity.

Contrary to the statements of Da Fano, cellular reaction in the subcutaneous tissues of immunized animals is present only in the region infiltrated by the injected cells. This fact becomes conspicuous when the immunizing injection is given intraperitoneally, in which case no cellular accumulations are noted in the loose connective tissues.

No constant cellular changes are noted in the bone-marrow, thymus, or thyroid gland, liver, or kidney of the treated animals.

Nakahara, W., and Murphy, J. B.: The Effect of Small Doses of *X*-Rays of Low Penetration on the Lymphoid Tissue of Mice. *The Journal of Experimental Medicine,* Jan. 1, 1920, xxxi, No. 1, p. 13.

The destructive effect of *x*-rays on the lymphoid tissues was early noted in the study of the biologic effect of this agent. The stimulating action on the circulating lymphocytes was first observed in the author's laboratory and was applied experimentally in the study of *x*-ray effects on spontaneous tumors of mice. The Coolidge tube, which permitted the standardization of dosage, was used.

Experiments were made upon rabbits and mice. The histological study and blood-counts in rabbits confirmed the general nature of the stimulation by showing a marked degree of increase in the number of mitotic figures in the germinal centers of the lymphoid organs of these animals. In the case of mice, similar results were observed.

A dose of *x*-ray governed by the following factors induced a stimulation of the lymphoid tissue in mice: spark gap 7/8 inch, milliamperage 25, distance 8 inches, time of exposure 10 minutes. Within four days after this dose an abnormally large number of mitotic figures appeared in the lymphoid tissue of the spleen and lymph-glands, indicating an acceleration of the proliferative activity of the tissue.

THERAPEUTICS

Schwerdtfeger, O. M., and Tinker, M. B.: Pneumonias Following Injections of Arsenobenzol. *American Journal Syphilis,* July, 1919, iii, No. 3, pp. 398-403.

Intravenous injections of arsenobenzol were given to 9 syphilitic soldiers. In all cases symptoms of respiratory irritation appeared immediately, followed by critical bronchopneumonia, which ended in complete recovery. The symptoms which appeared were *pain,* either vague or cutting, in the anterior and lateral part of the chest, short, catching *cough,* either unproductive or associated with the expectoration of blood-stained mucus, extreme *dyspnea, frequent, soft pulse,* mild *febrile reaction.* Physical examinations of the chest were negative. Seven cases showed nausea or vomiting.

After from one to three days bronchopneumonia appeared, characterized by dyspnea, cough, expectoration, soft pulse ranging from 88 to 116, and, in three cases, slight cyanosis. Physical examination revealed

slight dullness at one or both bases, with diminished breathing, subcrepitant rales or small scattered areas of bronchial breathing with increased whispered voice. The chests were mainly dry, having only a few moist rales. The course of the disease was moderately severe, and recovery was complete in all cases. Blood cultures revealed *Streptococcus hemolyticus* in 3 cases, unidentified diplococci in 2 cases, no organisms in 4 cases. Sputum tests showed *Staplylococcus aureus* in 6 cases, *Streptococcus hemolyticus* in 2 cases, unidentified diplococcus in 1 case.

Technic.—The solution of arsenobenzol was made by dissolving the contents of seven tubes (each containing 0.6) in 175 c.c. of distilled water in a sterilized bottle containing sterilized glass beads, and shaking until the drug was entirely dissolved. Seven pipets of fresh, sterile 15 per cent sodium hydroxid solution were added, precipitation of the drug taking place as usual. The alkali was added drop by drop, and the solution was filtered through a sterile gauze sponge. The injection was immediately made by the syringe method, each patient receiving from 18 to 20 c.c. of the solution, which contained 0.467 of the drug. The efficiency of the sterilization method was tested, with satisfactory results.

Conclusion as to the Cause of the Reaction:

(1) The reactions were not caused by undissolved substances, for any such substances would have gravitated to the bottom of the container. Also undissolved substances might cause reactions in some cases, but not in all.

(2) They were not caused by living bacteria, for the irritating effect was immediate, and bacteria numerous enough to produce such an immediate reaction would have caused additional infections in other parts of the body. Also, the solution was proved sterile by later experiments.

(3) The water was not responsible, for water from the same source, and equally old, had been used for weeks without unusual reactions.

(4) The alkali was sterile and therefore not responsible.

(5) The patients were not over-susceptible to the drug and had had previous injections without the appearance of unusual reactions.

(6) The technic was not at fault, and had often been used before without unusual reactions.

(7) The immediate reactions were caused by chemical irritation.

(8) By exclusion it would seem that the arsenobenzol was responsible for the reaction.

Samples of the drug used were sent to the Surgeon-General for examination. The comments received in reply suggest that "some factor other than the essential toxicity of the preparation must have caused the bad results." They also emphasize the importance of using freshly distilled water for arsphenamin solution. "Thirty c.c. of water per decigram of arsphenamin is a safe dilution."

STOKES, W. R., AND MALDIES, H. W.: Specific Treatment of Typhoid Fever. *Boston Medical and Surgical Journal,* Nov. 27, 1919, clxxxi, No. 22, p. 625.

The authors give an extensive review of the literature bearing on the specific and nonspecific treatment of typhoid fever. They report three series of cases treated by themselves consisting of 31, 60, 22 and 10 cases.

In the first series of 31 cases the dosage used was 10,000,000 bacteria given subcutaneously. The number of doses varied between 1 and 6. The average duration of the disease was thirty days, and cases receiving the first dose early, that is on the second, third and fourth day of the disease, showed no tendency toward decrease in duration. The mortality was 5 or 16.1 per cent.

The second series was treated in 1913 and consisted of 60 cases. Doses beginning with 50,000,000 were used, and were increased to 100,000,000 and 250,000,000 at intervals of several days. The record cards relating to

these were lost, but the impression gained was that the duration of the disease was shortened in a fair number of cases, and a few showed rapid decline to normal after the second dose had been given.

The third series, that of 10 cases, was treated in 1916. The intravenous route was employed. Sensitized typhoid vaccine, made from Rawling's strain was used. Immune serum was added to the vaccine until all agglutinations were saturated by the immune serum. Of these 10 cases, 6 were treated before the tenth day and showed positive blood cultures and Widal reactions. Four were treated after the tenth day, the Widal being positive but the blood cultures negative. In 5 of the 6 early cases treated, two injections were given at intervals of four days, and in 3 of these the disease seemed to have been aborted. In the other 2 the temperature dropped to normal in eighteen days and remained so. In the other early case one injection was given and the case followed the regular typhoid course. Doses of 300,000,000 were used. In the 4 late cases the vaccine did no harm, but no benefit was seen.

One of the authors (Stokes) prepared a curative serum by injecting hogs with bouillon cultures of typhoid, and this serum had an agglutinative titer of 1/45,000. Twenty-three cases were treated with this serum in all stages of the disease, with two deaths, one resulting from otitis media, the other from intestinal hemorrhage. Of the other 21 cases, 15 seemed to show favorable results from the use of serum.

The authors conclude: (1) That mortality —usually about 10 per cent—can be reduced by specific and possibly by non-specific treatment; (2) that vaccine and curative serum, either alone or in combination, should be tried out; (3) that large numbers of cases should be treated by various methods and each group compared with other groups for statistical study of fatality, complications, relapses, height, and duration of fever; (4) that better results are obtained from large doses and from the early institution of the treatment.

FORDYCE, JOHN A.: Intraspinal Therapy in Neurosyphilis. *American Journal Syphilis,* July, 1919, iii, No. 3, pp. 337-375.

Syphilitic infection of the nervous system may exist for many years without causing local or objective symptoms, except for slight character defects, pupillary changes, or lapses of memory. Blood and spinal fluid tests in such cases are positive. The spirochetes are deposited in the cerebral cortex during the period of generalization of the organisms and remain inactive, hidden in the deeper parts of the tissues and inaccessible to ordinary treatment, although the progress of the infection is modified or delayed by therapeutic agents given by the usual channels. The condition is rarely cured and relapses are frequent, following temporary improvement. A persistently positive Wassermann reaction, uninfluenced by intensive treatment by ordinary methods, indicates the possibility of neurosyphilis without the objective symptoms. The blood becomes negative for a time, but is reinfected by the spinal fluid. Eventually failure of sexual power, loss of memory, hyperactivity or inequality of reflexes, etc., are noted. An examination of the spinal fluid reveals the source of infection.

Favorable results are sometimes obtained by intraspinal therapy where mercury and salvarsan by mouth or intravenously have failed, due to the inaccessibility of the foci of infection. A properly prepared serum, diluted with from 30 to 40 c.c. of spinal fluid before its introduction into the spinal canal, may usually be employed without danger, if indications for its use are present. The preparation of the serum, according to the author's method, necessitates a previous inthaspinal salvarsan injection. Where the intensive use of this drug is followed by jaundice, dermatitis, etc., the serum to be used must be taken from another treated case. During treatment the activity of the spirochetes may be controlled by examinations of the spinal fluid, and the treatment regulated accordingly.

The indications and contra-indications in

the individual cases or types of cases must be considered. In the pure type of arterial syphilis of the brain or cord with negative or faintly positive serologic findings, there is no indication for intraspinal therapy. Antisyphilitic drugs should be given as usual. In rapidly developing optic atrophy, or in cases in which intravenous therapy and other methods have been employed without success, no time should be lost in introducing the intraspinal method. An early syphilitic meningitis with high cell-count and other positive findings offers the best prognosis. The sooner the meningitis is detected and treated, the less the danger of involvement of vital brain tissues. The only hope of arresting the degenerative process lies in its early recognition and in persistence in treatment.

In the case of tabes the condition progresses because the cause persists; new foci are formed by fresh invasions of the organisms inaccessible to ordinary treatment. Advanced posterior column degeneration is irremediable, but many associated symptoms, such as pain or crises, are due to an associated meningitis and may be relieved by treatment. The tabetic group includes:

(1) Arrested cases with Argyll-Robertson pupils, absence of deep reflexes, anesthetic areas, and negative blood and spinal fluid. In such stationary or abortive cases intraspinal therapy is contra-indicated. If the reaction is negative, it is to be assumed that the organisms have disappeared as a result of previous treatment or of the defensive processes of the body, and that the degeneration is non-progressive.

(2) Pretaxic tabes with pupillary changes, absence or irregularity of reflexes, bladder and sexual weakness, pain, fairly high cell-count, positive globulin and Wassermann reactions, and luetic curve. In these cases the prognosis is relatively good, and arrest of the degenerative process is to be expected.

(3) Advanced cases with ataxia, Romberg, bladder and sexual weakness, pains, crises, low cell-count, positive Wassermann reaction, excess of globulin and luetic curve. In these cases there is little hope of relief, because of the advanced degeneration. In low tabes there is the danger of irritation of the cord and consequent increase of symptoms, following injection of the serum, although in high tabes the indication for treatment are more favorable.

(4) More or less advanced tabes with a cell-count varying from 20 to 100 or more, a positive Wassermann reaction in the high dilutions, and a paretic gold sol. curve. In such cases the prognosis is unfavorable, as the reactions respond slowly to treatment, if at all.

In optic atrophy the importance of systematic diagnostic examination of the eyegrounds is to be emphasized. Intraspinal therapy is indicated where the fluid shows meningitis with the positive phases of syphilis. In advanced atrophy with negative findings in the fluid, little can be hoped from treatment of any sort, but persistent intraspinal therapy may arrest the progress of the condition and preserve the remaining vision.

When persistent intraspinal therapy fails to influence the Wassermann reaction the probable development of paresis must be considered. Such cases may persist for years without showing mental or objective symptoms, but the spinal fluid will give the findings of paresis. Intraspinal treatment modifies the course of the degeneration and often enables the patient to resume his normal activities for a time.

The results obtained by the intraspinal treatment of preparesis are so encouraging that the author recommends carrying it out to the limit of the patient's endurance. With careful technic and proper preparatory treatment, danger to the patient's life, or damage to the cord or brain, may be entirely eliminated. However, the use of this method by inexperienced clinicians, without proper laboratory facilities or adequate serologic control, will certainly result in failure.

The author gives charts to illustrate the

serologic results of intraspinal therapy. The cytological reaction is the first to be influenced. In some cases treatment must be continued for one or two years before the globulin or Wassermann reactions show modifications.

"In old cases of neurosyphilis a gradual diminution in the intensity of the Wassermann reaction is of good prognostic import," and cases in which the test has finally become negative show no recurrence.

GRENIER, E.: Artificial Pneumothorax in the Treatment of Pulmonary Tuberculosis. *Canadian Medical Association Journal*, Feb., 1919, ix, No. 2, pp. 141-3.

The author bases his study on the results of 2,000 insufflations and treats of adhesions as an obstacle often met with in inducing pneumothorax.

"Pleural adhesions exist nearly always in pulmonary tuberculosis; when of recent age, they are, as a rule, elastic; when of long standing, usually difficult to extend. Before trying to induce pneumothorax it is important to know of their existence and location. This is not easy. Knowing that the motions of the thorax are very restricted at the apices, we can assume that infiltrations developing there cause adhesions: the clinical forms of the disease, such as postpleuritic or fibroid tuberculosis, lead us to the same conclusion. These deductions are made from general knowledge and from the previous history of the patients, but the physical examination gives us many other details."

Inspection of the patient from the front during a natural breath, and during a forced breath, shows flattening—supra—or intraclavicular, unilateral, or bilateral. Unless the patient is in the last stages of the disease these hollows indicate underlying adhesions. A retraction located at the base of the chest also suggests pleural adhesions, accompanied by lagging. However, active inflammation also causes diminution of motion.

Profile examination sometimes shows a depression at the inferior spaces, during a deep breath, suggesting pleural adhesions at the base of the lungs.

Inspections from the back yield few useful facts. Palpation may show the location of adhesions.

The vocal fremitus is diminished, but it varies in intensity with the thickness of the muscles and adipose tissues, and is naturally weak, or absent, in women.

Adhesions do not modify percussion sounds, but when thick they diminish the intensity.

In auscultation adhesions enfeeble the respiratory murmur. If accompanied by cogwheel respiration this diminution indicates adhesions following pleurisy; if accompanied by rough respiration, it reveals also underlying fibroid tissue.

Fluoroscopic examinations show shadows indicating adhesions, but the data revealed thus are often indefinite or incorrect; however, they are of some use to the physician practising artificial pneumothorax, "because his intervention is freer outside of the adhesion zone, and the danger of gas embolism is avoided."

In the presence of strong adhesions the author was able to establish small air chambers, in the superior part of the thorax and at the base. The adhesions gave way, opening up communication between the two chambers.

In one case in which distended, elastic strings of adhesions were indicated on the *x*-ray plate, the author found the pleura thick, and puncture was difficult. The diaphragm was high and the oscillations of the manometer were hard to interpret.

The author concludes: "Seek by all means to localize adhesions, if any exist; then, to avoid danger and pain to the patient, make your intervention outside of their zone. If this is impossible, do not abandon this mode of procedure without trying to establish several air chambers in an endeavor to overcome the resistance of adhesions."

GAMMONS, H. F.: Observations in the Pneumothorax Treatment of Pulmonary Tuberculosis. *The Boston Medical and Surgical Journal,* May 8, 1919, clxxx, No. 19, pp. 529-31.

The results from artificial pneumothorax are so often good that the author finds it necessary to mention the possible dangers of the treatment.

The age of the patient and the presence of associated disease of the other organs must be considered. Young and very old patients are not good subjects for induced pneumothorax.

We must also consider the complications of the treatment, such as embolism, pleural shock, pleural effusion and hemorrhage, "walling-in," and discharging cavities, resulting in general poisoning.

The treatment of left-sided cases is not as hopeful as that of right-sided. In left-sided cases marked displacement of the heart is often noted, and sometimes vomiting, due to pressure on the stomach, and severe headache.

Pleural effusions, often purulent, occur in about 20 per cent of cases treated by this author.

The author draws the following conclusions:

(1) The possibility of using artificial pneumothorax should be considered in every case of pulmonary tuberculosis.

(2) Hygienic methods should be used first, and then, if the indications for pneumothorax are favorable, this method should be used.

(3) This method should not be used as a last resort.

(4) After the pneumothorax is begun and there are good prospects of a complete collapse, treatments should be administered often. It is best to give 300 c.c. at the initial attempt and to repeat the dose every 2 or 3 days until the lung collapses, the amount given at each operation depending upon the manometric reading.

(5) If numerous adhesions prevent collapse the treatment should be discontinued as hopeless.

(6) Ulcerative cases offer the best results. Unilateral cases without much sputum and fever should not be treated with pneumothorax, even when the entire lung is full of large, moist rales. The collapse in such cases would tend to tear up the fibrosed areas.

HERRICK, W. W.: Treatment of Meningococcic Infections. *Southern Medical Journal,* October, 1919, xii, No. 10, p. 588.

The author points out that the mortality from meningococcic meningitis has declined from 70 to 90 per cent in the earlier epidemics to from 15 to 30 per cent in the more recent ones. This decline, he says, is not due to a diminution in the virulence of the infection, but to more effectual treatment in general, and to specific serum treatment in particular. In an experience of 340 cases, he has also been impressed with the modern tendency to "focus the entire attention upon the serum" and "to neglect some general measures."

Herrick orders for each patient complete isolation in a quiet, easily darkened room, with light that does not shine in his face. He finds that the patient is more comfortable in a single, narrow, high bed with a single small pillow, or with none at all. An initial purgative is desirable. The skin must be taken care of, to prevent bed-sores. *Cold baths* and sponges, however, should be *avoided.* The bladder must be watched carefully, and if catheterization is resorted to it is to be carried out with strict asepsis and should be followed by the administration of 7½ grains (0.492 gram) of hexamethylenamin four times a day, in a large quantity of water (adult dose).

The extreme irritability, headache and apprehension in the early stages of the disease are best allayed by morphin. An adult may be given 1-6 grain (0.01 gram) as often as is necessary. This drug is of value not only on account of its anodyne effect but also

on account of its tendency to prevent serious immediate serum effects. As an aid to the morphin, chloral hydrate, from 15 to 20 grains (0.972 to 1.3 gram), with or without sodium bromid 40 grains (2.6 grams), may be given two or three times a day. While an ice-cap on the head may help to control the headache, it has no specific effect upon the disease [and if it makes the patient uncomfortable it may safely be dispensed with—Abstr.].

Patients should be persuaded to take a sufficient amount of food. It need not all be fluid, and should be given at least every three hours. Inasmuch as the bodies of those dying from meningococcic infections almost always show dehydration at autopsy, an adequate intake of fluid during the disease is of paramount importance. It may be necessary to resort to hypodermoclysis or to infusion of saline solutions, to meet this indication.

The eyes are to be shielded from strong light, but otherwise left alone. If meningococcic conjunctivitis is present, the conjunctiva is to be washed gently every two hours with a saturated solution of boric acid and 1 or 2 drops of a 20 per cent solution of argyrol, to be instilled two or three times a day.

In the intervals a 50 per cent solution of antimeningococcic serum may be dropped into the eye with good effect. Cold compresses on the eyes are also very beneficial.

The frequent presence of the virus in the mouth, nose and throat necessitates great care in the collection and disposal of all discharges from these sources. This is important both for the patient and for those in attendance upon him.

At this point in his article Herrick calls attention to the fact that meningococcic infection may be said to have three stages:

(1) Local, in the nasopharynx, tonsils, nares, accessory sinuses or conjunctivæ.

(2) General, *i. e.*, an invasion of the blood stream—meningococcic sepsis.

(3) Local involvement of the meningeal membranes; this occurs in 95 per cent of the cases with or without involvement of the joints, lungs, eye, pericardium and other organs.

The clinical picture of the first or so-called carrier stage shows nothing specifically diagnostic, and the condition can only be recognized by culture. The treatment is purely local. Dicholoramin-T in 2 per cent solution is useful as a nasal and pharyngeal spray. Normal saline solution, mild alkaline antiseptics, or 30 per cent peroxide, may be employed with equally good results. Stubborn cases may yield to undiluted antimeningococcic serum applied locally. The majority of carriers are cured by "time." About 1 per cent of them will not respond to any kind of treatment. These are undoubtedly cases with inaccessible foci in the nasopharynx, adenoids or accessory nasal sinuses. These foci can best be dealt with surgically. It must, however, be borne in mind that local surgical procedures in such cases may result in general infection. Some of these resisting chronic carriers have received injections of from one half to one million dead meningococci subcutaneously twice a week for two or three weeks, with little result, because, in the opinion of Herrick, the chronic carriers vaccinate themselves continually from the focus of infection which they harbor.

The second and third stages may overlap each other. Pure meningococcus sepsis, being difficult to diagnose, is frequently overlooked. Its average duration is forty-eight hours; it may, however, be transient, may be prolonged for days or weeks, or it may merge into the third stage from which, owing to the features of a general infection with a normal cerebrospinal fluid, it may be impossible to differentiate it.

The therapeutic aim of the premeningitic stage of sepsis is to sterilize the blood serum by giving large intravenous injections of anti-meningococcic serum. To guard against the possible untoward effects of large intravenous injections of the serum, Herrick advises the following procedure: 0.01 c.c. of horse serum in injected into the skin of the forearm until a small welt is raised. The same quantity of a normal salt solution is

injected into the same part of the limb about two inches from the site of the first injection, as a control. If the patient is sensitive, an urticarial wheal appears at the point of injection of the serum. Within a few minutes this wheal may attain a diameter of two inches or more. Its absence does not rule out sensitization. If the test is negative, from 0.5 to 1 c.c. of serum is injected subcutaneously as a desensitizing dose. If, however, the test is positive, greater care is necessary, and only 0.1 c.c. is injected. If no symptoms result, 0.5 c.c. is injected thirty minutes later, then 2, 6 and 10 c.c. at half-hour intervals. If no untoward effects follow these injections, intravenous treatment may safely be begun.

Desensitization may be aided by hypodermatic injections of from 0.01 grain to 0.02 grain (0.0006 to 0.0013 gram) atropin sulphate (adult doses) half an hour before the intravenous injection is given. Morphin may also be administered by hypodermatic injection in doses from 1-6 to 1-4 grain (0.01 to 0.016 gram) to allay the restlessness of the patient. Herrick never omits the atropin in any case. One hour after the desensitizing injection in subjects with a negative skin test, or one hour after the injection of 10 c.c. without reaction in sensitive subjects, the first intravenous injection may be given. Although the serum may be given pure, it is safer to dilute it with equal parts of normal salt solution. The simplest apparatus is a 20 c.c. Record or Luer syringe. In adults the vein at the elbow is the most convenient site; the external jugular may also be used. In infants the serum may be given by way of the longitudinal sinus, which may be reached through the anterior fontanel.

The first 15 c.c. should be injected at the rate not exceeding 1 c.c. per minute; if no serious results follow this slow injection, the remaining serum may be given at a much more rapid rate. The injection of 100 c.c. need not take more than thirty minutes. While the first 15 c.c. are being injected it is well to be alert for immediate serum effects. These may be manifested by dyspnea, collapse, pain in the precordium, restlessness, rapid, weak, irregular pulse, cold sweat, nausea, vomiting and urticaria. If these symptoms are slight the injection may be continued, but if they are more severe the injection should be stopped and another attempt made in an hour or two. If the manifestations of anaphylaxis do not cease when the injection is stopped, from 10 to 15 minums (0.6 to 0.92 c.c.) of adrenalin should be given subcutaneously or intravenously if the dyspnea or collapse are marked. It may even become necessary to resort to artificial respiration.

In severe cases of the disease, in an adult, 100 c.c. of the serum at one dose should be given every six or eight hours, in less severe cases every twelve or twenty-four hours, until there is a definite improvement, or from four to six doses have been administered. The average case will not require more than three intravenous injections.

In the third stage, in the majority of cases, the intravenous treatment is combined with the intraspinal. In cases in which the disease has become localized in the meninges before a diagnosis could be made, intraspinal therapy alone may be sufficient. This is especially true of the less serious type of infection.

After describing the technic of spinal puncture, Herrick points out that this procedure has two objects: (1) drainage, (2) the introduction of the specific antiserum into the spinal canal, and its direct contact with the meninges. Given a case of well-marked meningitis, with a thick, purulent spinal fluid and marked systemic disturbance, the fluid is removed until the rate of flow becomes one drop every two or three seconds or until the patient complains of severe headache. If the fluid is clear it is not safe to remove more than 8 c.c. At no time should it be allowed to escape in a stream.

After the fluid has been withdrawn, about 30 c.c. of serum, warmed to the body temperature, are allowed to flow into the subdural space by gravity. It should never be injected by force. During the acute stage of the disease, if a larger amount of cerebro-

spinal fluid is readily obtained by lumbar puncture, from 45 to 60 c.c. of serum may be injected. As a general rule from 5 to 10 c.c. less serum than the amount of fluid withdrawn, should be injected. An average case requires about three or four doses, one every three hours; milder cases may improve after one or two treatments every twenty-four hours; severer cases may require ten or twelve.

Herrick considers that discontinuance of treatment is indicated: (1) when the temperature falls, with improvement of the general condition, (2) when the cerebrospinal fluid is less cloudy, free from organisms, and when leukocytes reappear in numbers.

If the intensive serum treatment as outlined above is not followed by success it may be due to one more of the following causes: (1) An overwhelming infection is present. (2) The serum does not contain antibodies specific for the particular strain of organism. (3) The organisms, being walled off, are inaccessible to the serum. (4) Complications other than meningitis are present. Of these, according to the author, the second is the most common cause.

If intraspinal treatment gives rise to discomfort, pains in the back, legs or head and other evidences of hypersensitiveness of the meninges to the serum, it is best to discontinue drainage by lumbar puncture, unless the fluid is so cloudy and thick that "block" may result.

Serum sickness, characterized by fever, an urticarial or erythematous eruption, joint involvement, glandular swellings or edema, may appear from the seventh day after the beginning of the treatment. Although these symptoms do not contra-indicate further serum treatment, it is best to establish the absolute necessity for its continuance.

A complicating hydrocephalic meningitis, due to interference with the absorption of the cerebrospinal fluid by inflammation and subsequent thickening of the arachnoid villi, may occur early or late in the disease. It is more common in children than in adults. As a result of this "block," drainage is impaired. This is followed by an increased intracranial pressure, characteristized by an increased clouding of consciousness, delirum, general muscular rigidity, tremor, emaciation, and a failure to obtain more than a few drops of thick cerebrospinal fluid by spinal puncture. "Block" may be prevented in some cases by repeated drainage by lumbar puncture at twelve-hour intervals, thus preventing stagnation of the fluid and the resulting adhesions. If "block" diagnosticated, puncture of the lateral ventricles through a trephine opening in adults, or through the anterior fontanel in infants, is to be done without delay. As much fluid as can readily be withdrawn is removed, and a somewhat smaller amount of serum injected. This procedure may be repeated every twenty-four hours. The author also mentions in this connection the usefulness of Cobb's method of relaxing the neck muscles under anesthesia and the manipulation of the head and neck with the needle in the spinal canal, in order to break up adhesions and to reestablish drainage. In some cases the same results have been obtained by puncture of the cisterna magna, and by other similar surgical procedures. To obtain the best results in "block," treatment must be instituted early and must be carried out energetically. All these methods must be reinforced by a high caloric diet and by intravenous injections of normal salt solution or 20 per cent glucose.

Meningococcus arthritis is as a rule limited and without serious sequelæ. If swelling and pain are severe, the joint exudate may be aspirated and serum introduced. Meningococcic pericarditis with effusion has been treated successfully with aspiration and injection of 30 c.c. of serum. While meningococcic endocarditis seems to be a hopeless complication, Herrick thinks that large intravenous injections of serum may be tried.

In the local treatment of meningococcic panophthalmitis it is important to be careful not to injure the eye. If after the application of atropin and intravenous injections of the serum the condition is not favorably influenced, and if the patient is suffering from severe pain, it is advisable to enucle-

ate the eye. Striking improvement generally follows in the patient's general condition. The author warns against resorting to this heroic procedure too early; at least several weeks should be allowed to elapse, after the beginning of the disease, as surgical procedures undertaken too early may be followed by a general dissemination of the infection.

The post-meningeal headaches, fatigue, vasomotor disturbances, photophobia, the paresis of the limbs, etc., etc., usually improve in time. Iodid of potash may be administered to aid absorption of the exudate. The poor mental condition in which these patients may be left after the acute symptoms of the disease have subsided, is best treated by psychotherapy. The cranial and peripheral nerve palsies which do not disappear in three months usually remain permanent.

Hopkins, Arthur H.: The Treatment of Climacteric Hypertension. *New York Medical Journal,* Dec. 6, 1919, cx, No. 23, p. 930.

The frequent occurrence of high blood-pressure in women at the menopause, and the paucity of the literature on this subject led Hopkins to present this paper. The type of hypertension he describes has its onset at or soon after the menopause in apparently healthy women who are frequently overweight. The common emotional instability of these patients is reflected in a similar instability in their blood-pressures. The earliest manifestations of the condition are symptoms constituting the gastric neuroses group with constipation and marked evidence of intestinal fermentation. The gastro-intestinal symptoms are followed by nervousness and pains, chiefly in the extremities, headache, and later by cardiac difficulties. The blood shows no changes, as a rule, secondary anemia being present only in cases with complications. Repeated urine analyses, functional tests and forced feeding with proteids, at this stage of the disease, show nothing significant. For many years after the onset there is no evidence of fibrosis of the peripheral vessels.

The author ascribes the condition to the following etiological factors:

(1) A change in the glands of internal secretion, possibly a diminution in the functioning of the corpus luteum with its accompanying effects upon the pituitary, thyroid and adrenals.

(2) The continuous worrying and mental strain which adds still further to the emotional instability of the patients.

(3) Constipation, which is very common in most of these women. As a result of one or all of these factors there are spasmodic attacks of increased vessel tone, which gradually becomes more constant and which persists until finally, at sixty or thereabouts, evidence of vascular fibrosis becomes discernible.

In the treatment of these patients Hopkins first attempts to win and hold their confidence, and at the same time impresses them with the fact that their high blood-pressure does not necessarily mean the high blood-pressure of disease of the kidneys. These patients manage to carry on their daily life and activities until, at sixty years or later, either the heart begins to show evidence of decompensation, or a cerebral vessel ruptures and terminates the course of the disease. The cardiac decompensation probably occurs more frequently, and as the break is a gradual one, the physician is called upon to treat it, and not infrequently discovers at that time that his patient has had hypertension for years.

In the first stage of the disease the author takes a careful anamnesis, in order to exclude the possibility of previous diseases; which might have produced nephritis or arteriosclerosis. He also searches for possible local foci of infection, and examines the peripheral and retinal arteries for fibrosis. The finding of normal kidney functioning is a great aid in establishing the diagnosis of climacteric hypertension, particularly when the urine shows a faint trace of albumin and, at times, a few hyaline casts. After the diagnosis is certain, he regulates their exercise, lengthens their hours of rest, and where

nervousness is a prominent symptom, he orders them to stay in bed for breakfast. He aids in combating their gastro-intestinal disturbances and their tendency to obesity. He regulates their water intake so that they receive from one to one and a half liters a day. As an aid to elimination, and to overcome the constipation, he orders high colonic irrigations with normal salt solution at least once a week. He also recommends an occasional dose of calomel, salts or castor-oil, and, in obstinate cases, administers paraffin oil night and morning. In cases of spastic constipation he suggests benzyl-benzoate in the form of an emulsion with acacia in aromatic elixir of eriodictyon.

For elimination through the skin, a warm cleansing bath every other night, alternating on the other nights with a warm salt bath lasting from seven to ten minutes, is a useful means of bringing a general relaxation which promotes sleep, and at the same time has a beneficial effect on the high blood-pressure.

To allay the nervousness the above measures are combined with the administration of corpus luteum extract, by mouth or hypodermatically, according to the method employed in the nausea of pregnancy by John Cook Hirst. The corpus luteum may be used in conjunction with thyroid extract, in ½ grain (0.032 gram) doses, especially in obese patients. The author also advises sedatives such as cannabis indica, sumbul, valerianate of ammonia, and bromids, if they do not disturb the digestion. (Bromids are in our opinion not advisable in these cases, because they retard elimination—Abstr.)

The author sounds a very important warning that "too great a reduction of pressure will do far more harm than good in any stage, and, indeed, the patients usually feel better with a pressure of from 200 to 230 than they do with a pressure of from 180 to 190 degrees."

The second stage of the disease in characterized by a greater severity of the symptoms of the first stage. The general measures enumerated above will serve for the second stage, but must be carried out more vigorously. The treatment is entirely symptomatic and must be individual. When pressure symptoms are threatening, sweat baths are indicated, but here again the condition of the patient's heart must be watched with great anxiety; in some cases a complete rest in bed for two or three weeks may be a safer procedure than sweating. At any time it may be necessary to resort to the nitrites. Of these, the writer prefers the spirits of glonoin, from 1 to 3 drops given three or four times a day. Sodium nitrate, although an excellent vasodilator, is not as good as glonoin, because of its tendency to aggravate an already existing disturbance of the stomach. The more severe and obstinate cases may require the withdrawal of from 250 c.c. to 350 c.c. of blood a day, for a few days.

The management of the third stage consists in the prevention of cardiac decompensation, and cerebral hemorrhage. Drugs at this time are of little avail; guarding against mental and physical stress and directing the patient into the formation of habits conducive to a simple and quiet life is all that can be done.

Wilcox, Reynold Webb: The Therapeutics of Aspidosperma. (Quebracho). *Medical Record,* Oct. 25, 1919, xcvi, No. 17, p. 698.

Quebracho became official in the U. S. P. on Sept. 1, 1916, and Wilcox says that it is a valuable remedy in cases of embarrassed breathing, as in emphysema, chronic bronchitis, or chronic pneumonia; in many instances, it gives almost instant relief. In proper doses it relieves not only the dyspnea, but also the cyanosis and the sense of "choking." It stimulates the respiratory center and assists the oxygenation of the blood. Its alkaloid, aspidospermin, represents fairly well the physiological action of the drug, and it has the further advantage that it may be given hypodermatically in ½ grain (0.032 gram) doses.

It may relieve symptomatic asthma when it is due to uremia or cardiac failure. It is of aid in shortness of breath due to cardiac hy-

pertrophy, on account of its depressant effect upon the cardiac musculature, and its influence on the nervous mechanism of respiration, which may even extend to the cardiac innervation. Because of its effect on the oxygenation of the blood it may also be used in asthma due to secondary anemia. Although its action is not curative, it appears to prevent a recurrence of the paroxysms.

After the administration of the drug there is usually a sensation of warmth in the head, some sweating and frequently slight salivation. The dose required for this purpose is from ½ to 1 teaspoonful every two to four hours; if long continued it is followed by nausea.

Wilcox is not prepared to advocate the use of quebracho in the dyspnea of mitral insufficiency unless the lesion is well compensated by cardiac hypertrophy.

In spite of the work done with this drug by Wood, its employment must still be said to be empirical. The author concludes his article by saying that "forty years of clinical observations have established the value of the remedy, so that it has properly been admitted to the pharmacopeia. Personally I have obtained brilliant results from its administration and occasionally had equally inexplicable failures."

Hyatt, Emery G.: The Action of Alcohol on the Heart and Respiration. *The Journal of Laboratory and Clinical Medicine,* Oct., 1919, v, No. 1, p. 56.

The varied effects on the heart and respiration were obtained when alcohol was administered to unanesthetized animals whose spinal cords had been severed previously (the day before), at about the level of the eleventh thoracic vertebra.

(1) When the drug is given by mouth there is a rapid rise and an immediate return to normal. This is due to local action.

(2) When the drug is given intravenously the results are as follows: (*a*) When it is given gradually in quantities sufficient to kill in from one to two hours, there is no effect until just before death, when a rapid fall of pressure takes place. (*b*) When it is given rapidly there is a sudden fall, followed by an immediate return to normal. There is no effect if the vagi are cut.

(3) When it is given by stomach, introduced by means of a stomach tube, there is no effect.

(4) When alcohol is introduced without excitement intravenously into the normal dog, there is no stimulation of the heart or respiration.

GLANDS OF INTERNAL SECRETION

Loeb, Leo: Studies on Compensatory Hypertrophy of the Thyroid Gland. *Journal of Medical Research,* July, 1919, xl, No. 2, p. 199.

Loeb's studies upon the evidences of compensatory hypertrophy in the remaining portion of thyroid gland tissue of partially thyroidectomized guinea pigs show that the gland normally has a fairly wide physiological margin of safety. With the extirpation of less than one lobe, the remaining portion shows little or no tendency to hypertrophy. The hypertrophy is at the threshold after the extirpation of one lobe, is definite, though weak, after extirpation of one and one half or one and two-thirds of a lobe, and becomes very marked after the removal of the greatest part of the thyroid. The maximum hypertrophy seems to take place from the sixteenth to the thirtieth day after operation, regardless of the amount of tissue removed. Hypertrophy does not occur in the thyroids of fetuses of pregnant thyroidectomized guinea-pigs.

Gruber, Charles, M.: The Significance of Epinephrin in Muscular Activity. *Endocrinology,* April-June, 1919, iii, No. 2, p. 145.

Adrenalin injected intravenously in small doses increases the height of muscular contraction, and in five minutes or less restores the increased threshold stimulus, caused by fatigue of the nerve-muscle or muscles, as much as does rest for from one to three hours. Epinephrin, when injected into the perfusion fluid of fatiguing muscle, causes vasoconstriction, and increased height of muscular contraction, the latter depending upon the strength of adrenalin injected. The inference is drawn that this is brought about by a specific effect upon the muscle in eliminating fatigue, and where the nerves are intact, by bettering the circulation through dilation of the vessels. Since, in perfused excised muscles, the betterments are so marked, and vasoconstriction in these preparations apparently so striking, epinephrin exerts some specific action on fatigued muscle, other than that due to mere circulatory changes.

Macht, D. I., and Matsumato, S.: Action of Some Ovarian and Corpus Luteum Extracts on the Pupil of the Frog's Eye. *Endocrinology,* April-June, 1919, iii, No. 2, p. 154.

Extracts of corpus luteum and ovary of the sow, from both dried and fresh gland, were used, equivalent in strength to 10 per cent of the fresh gland, and it was found that whether the fresh or the dried gland was used, corpus luteum caused a definite dilatation of the pupil of the frog's eye, in from thirty to sixty minutes. In some instances there was a very slight reaction with ovarian extract, which was interpreted to be due to the presence of lutein in the extract. The difference in reaction is so great, that so far as the effect on the pupil is concerned, the ovary and the corpus luteum are two different glandular bodies.

Loeb, L., and Hesselberg, C.: Studies on Compensatory Hypertrophy of the Thyroid Gland. (*a*) Hypertrophy in Autotransplants of the Thyroid Gland. (*b*) Does a Deficiency in Organ Function Influence the Transplantability? (*c*) Hypertrophy in Multiple Transplants of the Thyroid Gland. *Journal of Medical Research,* Sept., 1919, xl, No. 3, p. 265.

Loeb and Hesselberg report on a series of experiments which constitute a continuation of Loeb's work on compensatory hypertrophy of the thyroid gland. The viability and character of autotransplants, as affected by the amount of thyroid tissue removed, was studied. It was concluded that the physiological need of the organism for thyroid hormone had no influence upon the fate of the graft. Grafts grew as readily after the removal of a small part of the gland as after the removal of a large portion of it. When the graft took there was an early increase of mitoses, due presumably to the stimulation of the transplantation. Later increase of mitoses and hypertrophy were more or less proportionate to the amount of thyroid tissue removed (beyond a certain point), just as in the case of the remnant left in situ, and were taken to represent evidence of compensatory hypertrophy. The transplanted lobes of thyroid in the case of multiple transplantations had the same fate as the corresponding tissues in cases of single transplantation under otherwise similar conditions.

Howard. C. P.: Functional Diagnosis of Polyglandular Disease in Acromegaly and Other Disturbances of the Hypophysis. *American Journal of Medical Sciences,* Dec., 1919, clviii, No. 6, p. 830.

Experimental data on 5 cases of hypophyseal disease and 15 normal controls is submitted. A comparison is drawn with the investigation of Carl Csepai in 1914. The author's conclusions are:

(1) A decrease in the sugar tolerance, in the presence of other disturbing symptoms of

pituitary functions, justifies a diagnosis of increased activity of the pars intermedia.

(2) The adrenalin conjunctival test may be positive in cases of dyspituitarism in demonstrating a hypofunction of the chromaffin system.

(3) The subcutaneous adrenalin test is of doubtful value.

(4) Both the conjunctival and subcutaneous pituitrin tests yield doubtful results.

(5) The symptomatology is not altered upon the internal admistration of either the whole gland or the anterior or posterior lobes separately.

One of the cases showed a secondary hyperpituitarism from a greatly increased intracranial pressure, caused by a large sarcoma of the occipitoparietal lobe.

KENDALL, E. C.: The Physiologic Action of Thyroxin. *Endocrinology,* April-June, 1919, iii, No. 2, p. 156.

The iodin compound of the thyroid which was first called "alpha iodin," is now named thyroxin. Successive daily administration of thyroxin produces the symptoms of hyperthyroidism, and death as a termination, while enormous single doses may be given intravenously, with hardly any demonstrable effect, in dogs and goats. When 200 mg. were injected intravenously in a dog, during fifty hours 43 per cent of the iodin was excreted in the bile, and 13 per cent in the urine; the remainder was probably removed from the blood stream by the thyroid gland. It seems probable that under normal conditions there is an equilibrium between the amount of thyroxin in the thyroid, the blood stream, and the tissues, and that the latter fluctuates according to the energy demands of the body. In individuals with myxedema, the basal metabolic rate can be raised to any height, and so maintained by the injection of thyroxin, but there is a delay of days before the change occurs, and the reaction to a single injection continues for three weeks. Apparently the amount of thyroxin in the tissues determines the amount of activity of muscles, and while its absence does not produce death, it is necessary for a large and rapid energy output. It is concluded that thyroxin acts physiologically as a catalytic agent, and as such merely increases the rate at which the fundamental chemical reactions are carried out. When it is administered to an animal in repeated doses, there is a lag in the absorption of the substance by the tissues, and if the injections are stopped there is a return to the normal equilibrium, but if they are continued, the animal dies, not from toxicity of the substance itself, but on account of secondary reactions. The thyroid apparatus apparently permits a greater range of energy output than would exist without such a mechanism.

KRABBE, K. H.: Histologische und Embryologische Untersuchungen über die Zirbeldrüse des Menchen. Copenhagen, 1915 (Danish) and *Anatomische Hefte,* 1916, Heft 163 (liv, Heft 2).

The author has examined microscopically 350 pineal glands from children and adults and 30 from fetuses, but only 40 of the glands were judged to be sufficiently normal to give reasonable normal results. These results were the following:

The pineal gland begins to develop in the second fetal month. It consists in the beginning of two parts, a fold of the row of the diencephalon and a cellular mass on the anterior wall of this fold. In the further development the cellular mass is joined to the walls of the fold, and the fold is shut. There remains of the diverticles only the pineal recessus and sometimes a little cyst in the pineal body. These cysts are surrounded by glia, and might be starting-points for the cysts and glia plaques which are often found in the pineal body in adults. During the last period of fetal life and the first period after the birth the parenchyma is metamorphosed. After the metamorphosis the parenchyma consists of three different elements: (1) pineal cells, (2) glia-cells, (3) nerve-cells. Every group of these cells shows character-

istic signs. The granules in the nuclei which Dimitrowa has found are shown to be evacuated in the protoplasm. He does not believe in the existence of Loewy's pineal secretory capillary system. The connective tissue of the pineal gland is developed as early as the first year and is augmented in the following year. The amount of connective tissue varies very much; it may sometimes be found in small quantities in old persons and abundantly in children. In the connective tissue many mast-cells and "dust-bin-cells" are found. The concrements are usually first found at the age of two years. Muscle-fibers are not found. The amount of parenchyma decreases only a little from childhood to senility. The glial plaques, cysts, connective tissue and concrements are not to be considered as signs of involution, as they do not coincide with the destruction of the parenchyma. The pineal body is not to be considered as rudimentary. In regard to the function two theories may be advanced:

(1) That the pineal body has a nervous function, for instance that it is a sort of perceptive sensory organ regulating the pressure of the cerebrospinal fluid.

(2) That the pineal body is an endocrine gland.

The decision regarding this point can not be made in an anatomical way, although the existence of a number of amitotic figures points rather to a glandular than to a nervous function.

The paper is illustrated with 28 figures (colored lithographs, phototypes and autotypes).

Krabbe, K. H.: L'Infantilisme. *Nordisk medicinsk Arkiv,* 1919, Avd 2, li, No. 21.

The author gives the histories of 4 cases of infantilism in children. The results of his considerations are the following: In defining the infantilism it must be emphasized that it is a combination of stoppage of the growth with incomplete development of the genital organs. The infantilism is to be sharply distinguished from ennuchoidism, but can scarcely be distinguished from chetivism.

Infantilism may be produced by diseases in the thyroid gland and in the pituitary body. These forms may be called dysendocrine infantilism. But in other cases the infantilism may be found without any other sign of endocrine disease, and it is not proved that these infantilisms are related to the endocrine organs. This form of infantilism may be called essential infantilism, the terms meaning that we do not know anything about the origin of such cases.

Barker, L. F.: Remarks on the Functions of the Suprarenal Glands as Revealed by Clinical Pathological Studies of Human Beings and by Experiments on Animals. *Endocrinlogy,* July-Sept., 1919, iii, No. 3, p. 253.

The value of correlation between endocrine investigations, including those of the preclinical and medical sciences, as well as those of diagnosis and therapy, and the allied sciences of pathological anatomy and pathological physiology, is considerable, and lies in the difference in view-point of the various investigators. The clinical observations of Addison, and of later observers, have defined a syndrome associated with destruction of the adrenal gland and an insufficient supply of its secretion in the body. A second syndrome is noted which has to do with overactivity of the gland and is evidenced by a marked change in sexual characteristics, such as pubertas præcox, hirsutism, virilism.

The laboratory contributions have been:

(1) The two types of substance in the gland, the cortex and medulla were differentiated.

(2) It was found that in the human and higher animals the medulla is derived from the anlage of the sympathetic nervous system, whereas the cortex is derived from the germ epithelium, since in the lower animals these exist as parts of two anatomically sep-

arate series of organs, one a part of the so-called interrenal system, the other a part of the chromaffin system.

(3) It was proved that the function of the interrenal system was necessary for life, and that death of the higher animals is due to the absence of this interrenal part or cortex.

(4) Schaeffer demonstrated that extracts of the suprarenal gland, when injected, caused a rise in blood-pressure.

(5) The demonstration shows that this blood-pressure-raising substance was derived from the chromaffin part, the medulla, and is a well-defined substance known as adrenalin.

(6) A pressor substance was isolated which is not epinephrin, and is derived from the cortex.

The various hypotheses which sprang up from these discoveries have led to a vast amount of investigation.

McCaskey, G. W.: The Differential Diagnosis of Hyperthyroidism by Basal Metabolism and Alimentary Hyperglycemia. *New York Medical Journal,* Oct. 11, 1919, cx, No. 15, p. 607.

Utilizing the conclusions reached by Kendall and Plummer of the Mayo Clinic, in regard to the effect of certain quantities of thyroxin upon the tissue changes of the body, McCaskey bases his article on the following assumptions:

(1) The symptoms of hyperthyroidism and hypothyroidism are due to quantitative variations of thyroxin in the body cells.

(2) The fundamental phenomenon which dominates the entire clinical picture from cretinism to "Basedowism" is a perversion of the metabolic rate.

(3) This metabolic rate has its absolute equivalent, in accordance with fully established physical laws, in the heat-production of the entire mass of body cells.

(4) This heat-production is essentially a process of oxidation and is equivalent to the quantity of oxygen consumed, the latter being regulated by, and dependent upon, the metabolic rate.

(5) It is now possible, with the comparatively simple Benedict portable respiration apparatus, to determine clinically the oxygen consumption over a sufficient period of time, say from ten to fifteen minutes, with sufficient accuracy for all clinical purposes.

(6) If food metabolism is eliminated by from twelve to fifteen hours' starvation (the usual normal condition in the morning), and the metabolism of voluntary muscular effort is eliminated by absolute rest in the recumbent position (from one-half to one hour is sufficient time), there remains only the energy output—the heat-production—the metabolism of the circulatory and respiratory mechanism, with small and probably negligible additions for the phenomena of secretion, and the intracellular chemical changes of the cells of the body while at rest, which is called basal metabolism. This so-called metabolism is very constant, not only in the same individual but in all individuals, when calculated *in proportion to the area of body surface,* probably varying in health, in a large majority of people, less than 10 per cent from the average normal rate.

The clinical estimation of basal metabolism is thus a practical and reliable index of the functional activity of the thyroid gland in health and disease. Before making a final decision as to the functional state of the thyroid, certain important limitations and reservations must be taken into consideration. In other words, what other conditions, aside from perverted thyroid activity, may produce fluctuations of the basal metabolism? In reality such factors do exist, but they are of such a nature that careful clinical study will easily differentiate them.

Probably the most important of these factors is fever, the very essence of which, whatever its cause, is an increased metabolic rate. Pyrexial states from other causes must, therefore, be excluded, or their probable relative value determined, before an increased basal metabolism is attributed entirely to hyperthyroidism. In this connection it is well to bear in mind that in the severer grades of hyperthyroidism slight fever is quite com-

mon. Chronic infections such as tuberculosis and syphilis sometimes play a confusing role and prove the absolute necessity of a thorough clinical study of all cases.

Severe disease of the heart and kidneys is another condition which requires careful attention. In patients with dyspnea due to cardiac decompensation there is apparently a definite rise in the basal metabolism, while in edematous patients the metabolic rate is lowered.

In pernicious anemia, especially in its severe stages, there is a considerable increase in the basal metabolism, which is even higher in leukemia.

An interesting and rather important fact to remember is that a cup of coffee in the morning, before the metabolism observation is made, produces an increase of from 7 to 23 per cent in the basal metabolism.

A very important factor is the age of the patient. The average rate of 36.9 calories for women and 39.7 for men (by the "height-weight" formula) applies to the ages of from twenty to fifty, which includes most of the cases of thyroid disease. Above forty years, the rate begins to fall slightly.

Perhaps the most difficult problem is the clinical interpretation of the metabolic rate in borderline cases, in which the variations are necessarily small. These are naturally the cases in which diagnostic aid is most needed. It is generally agreed that the normal rate may vary from 10 per cent above to 10 per cent below the average normal. This does not mean that in a normal individual this wide range of deviation ordinarily occurs, but that in large group of apparently normal individuals deviations as great as these may be found. This would seem to suggest that each individual may have a "norm," just as Wunderlich proved long ago was true of temperature. Gephart and Dubois insist that the metabolism is not to be considered abnormal unless it varies from the normal by at least 15 per cent, although it is probably abnormal above 10 per cent.

The relation between hyperthyroidism and alimentary hyperglycemia is summarized by McCaskey as follows:

(1) Alimentary hyperglycemia following the ingestion of 100 grams of glucose is present in probably every case of thyrotoxicosis.

(2) It is rarely, if ever, present at the end of the first hour in normal individuals, although it may have occurred at the end of about thirty minutes.

(3) Its presence, therefore, in one hour, and especially in two hours, always indicates abnormal carbohydrate metabolism, unless gastro-intestinal function is delayed.

(4) It occurs in latent, and of course in manifest, diabetes, in alcoholism, malignant disease, arthritis, and very probably in a considerable number of infections, acute, or chronic, and allied to arthritis.

(5) Before attaching positive diagnostic value to alimentary hyperglycemia in suspected hyperthyroidism, these conditions and possibly others of which we are now learning must be excluded.

(6) While its positive value only may be considered corroborative, its negative value in excluding hyperthyroidism is very great, and probably exceeds 90 per cent.

(7) In hyperthyroidism there is no constant direct ratio between its intensity and the height of the alimentary hyperglycemia, although in general the blood-sugar values in severe cases are high.

(8) Too much importance should not be attached to alimentary blood-sugar values below 140 mg. of sugar in 100 c.c. of blood, although sharp lines of demarcation cannot yet be drawn.

Blatz, W. E.: A Review of the Recent Literature Bearing on the Function of the Thymus Gland. *The Journal of Laboratory and Clinical Medicine,* Oct., 1919, v. No. 1, p. 50.

It is clear from a review of the literature bearing on the thymus that it is impossible to attribute any function to the gland. The work of Hammer, who has recently studied the thymus function clinically and experimentally, concludes with the remark that the thymus is not an organ of internal secre-

tion. E. R. Hoskins considers that the thymus functions as a lymphoid organ in infancy and childhood, when a large number of lymphoid cells are needed to combat infection. The author expresses his opinion that the thymus is a lymphoid organ like an enlarged tonsil, which involutes when its presence is no longer necessary.

INTERNAL MEDICINE

Leary, Alfred J.: The Relation of Oral Infection to Systemic Disease. *Boston Medical and Surgical Journal,* Nov. 20, 1919, clxxi, No. 21, p. 611.

The author states that oral infection is more and more considered to be a cause of systemic disorders. The need of exact diagnosis in the search for the seat of infection is essential, but very often baffling in the attempt to localize the hidden focus exactly. He quotes Nodine as stating that 95 per cent of teeth in which the pulps have been devitalized and in which an effort has been made to fill the root-canals, have incomplete or no root-canal fillings. From 75 to 80 per cent of these cases have apical abscesses or infections radiographically discernible. Of the 5 per cent with perfect root-canal fillings many yield bacterial cultures. Focal infection from the ends of the roots of devitalized teeth is the most certain and frequent underminer of health.

Oral foci may cause secondary infections by way of the capillary or lymph systems. Absorption is most apt to be caused by blind, acute, or chronic abscesses, but may also come from pyorrhea pockets, diseased gums, or mucous membrane lesions.

Oral absesses are a common infection and their great importance must be realized in relation to secondary systemic disease. While there are other foci responsible, such as tonsils, sinuses, gastro-intestinal tract, and so on, the teeth are the seat of more infections than is the case with any other focus, and many cases are reported in current medical literature which have been cured by the extraction of diseased teeth. Among these are found gall-bladder infections, chronic appendiceal inflammation, chronic arthritis, gastric and duodenal ulcers, and many others. The author reports a severe case of acne of the face and shoulders which cleared up after the extraction of diseased teeth.

Special emphasis is laid on the fact that most pulpless teeth cause chronic inflammatory processes in the alveolar processes of the jaw, with slight local manifestations, but none the less responsible for systemic disease.

The conclusion is that all mouth conditions should receive most scientific attention and that no obscure disease can be regarded as thoroughly treated unless a study is made of the teeth and they are put in perfect condition.

Fairbanks, Arthur W.: Encephalitis Lethargica. *Boston Medical and Surgical Journal,* Nov. 13, 1919, clxxxi, No. 20, p. 578.

The article contains a complete description of this condition, including the clinical course, pathology, differential diagnosis, and treatment. The etiology is so far unknown, although Loewe and Strauss claim to have isolated a filterable organism from nasal washings, which, when injected into animals, produced the disease. Cultures were carried to the twelfth generation. The affection is usually most prevalent during the months of March and April. It occurs at all ages.

The author divides the clinical course into two stages: (1) the prodromal, (2) the developed stage of the disease. The prodromal period lasts from one to five days. The prominent symptoms are headache, vertigo

blurred vision, and slowly developing lethargy. Sometimes diplopia, nausea, general abdominal pain and muscular twitchings are present. In the developed stage, fever varying from 99° to 103° F. (37.22° to 39.44° C.) appears, lasting from three to six days. The somnolence increases, and a striking symptom at this stage is the mask-like facies. The speech is slow, nasal, and often hesitant. As stupor increases the patient lies expressionless; catatonia is frequently present. In 75 per cent of cases palsies of the 3d and 7th nerves are observed. Among prominent symptoms are ptosis, either unilateral or bilateral, strabismus, diplopia, and evidences of facial palsy. Half of the cases reported by English authors show facial palsy. Occasionally the 4th, 6th and 12th cranial nerves are involved. One case showing involvement of the 11th nerve has been reported. Twenty-five per cent of cases show no cranial nerve palsy and these are the most difficult cases to diagnose. Constipation is present and is obstinate. Late in the coma stage bladder and rectal incontinence may occur. The disease is as a rule free from signs of meningeal irritation. Kernig's sign is generally absent. The crebrospinal fluid is clear, under some pressure, and there is a lymphocytosis in about one-third of the cases.

The minimum safe figure to set for the duration of the disease is six weeks. The emergency from lethargy and restoration to health is extremely slow. Impairment of intellect may remain. Ataxia may persist for a long time. The mask-like facies may often persist. The average mortality is 20 per cent. The mortality is four times greater in adults than in children.

Pathology.—Macroscopically, hyperemia is visable. A constant finding is a limited area of meningitis in the region of the interpeduncular space. Sections of nuclei, peduncles, pons, and medulla show numerous punctate hemorrhages, chiefly of venous origin. There is mixed hyperemia of vessels, and lymphocytic perivascular infiltration, especially pronounced in the region of the peduncles and floor of the 4th ventricle.

The two conditions from which this must be differentiated are acute anterior poliomyelitis and tuberculous meningitis, which can so closely simulate lethargic encephalitis that only a postmortem can decide between them. One thing to remember is that in tuberculous meningitis the meningeal irritation phenomena are present, whereas in encephalitis lethargica they are usually absent. This is a help in differentiation. As regards treatment the author has little to offer. Meeting symptoms as they arise, and bearing in mind the tendency of retention of urine to occur, as well as bed-sores and pulmonary complications, seem to comprise his suggestions.

Thompson, L., and Kingery, L. B.: Syphilis in the Negro. *American Journal of Syphilis,* July, 1919, iii, No. 3, pp. 384-397.

Origin of Syphilis in the Negro.—There has been much uncertainty as to whether the American negro contracted the disease before or after being transported in slavery to this country. Alibert claimed that the negroes from Africa spread this plague in the New World; Leo Africanus stated that it was unknown in Northern Africa until introduced from Europe—probably by the Portuguese, according to Black. In any case it is practically certain that syphilis had appeared among the negroes before their transportation to this country.

Prevalence of Syphilis in the Negro.—Statistics on this subject are inconclusive, but there is a general concensus of opinion that the disease is far more common in the negro race than in the white. Quillian states that probably from 60 to 70 per cent of negroes have syphilis. Hospital statistics show a high percentage of syphilis among the negroes admitted.

Etiology.—The exciting cause of syphilis in negro is the *spirochaeta pallida,* as in syphilis in other races. The predisposing factors show certain differences:

(1) *Idiosyncrasy—Immunity.*—It is questionable that the negro is any more or

less susceptible to the disease than are other races. However, the sexual impetuosity of the negro may account for more abrasions in the integument of the sexual organs, and therefore for more frequent infections than are found in the white race.

(2) *Age.*—No age is free from syphilis, but as the negro begins his sexual activity at an early age he is apt to contract the disease much earlier than do members of the white race.

(3) *Sex.*—The social code which, in the white race, decrees that women must be more chaste than men, does not apply to the negro race, with the result that negro women are even more often infected than men.

(4) *Civil State.*—Due to the "well-known looseness of morals among the negroes, permitting more or less promiscuous sexual intercourse regardless of marriage or lack of it, it would seem that the civil state has little or no bearing on the subject."

(5) *Social Condition.*—Formerly, when the negro slaves were valuable property they were carefully taken care of and their health safeguarded. There was, therefore, comparatively little syphilis among them. Now, since the Civil War, the negroes have had to shift for themselves. In many cases, the social conditions among them are deplorable, especially as to housing conditions. It is natural that where ten or twelve adults sleep in the same room there will be increased opportunities for venereal infection. Also, the negro is usually uncleanly in his habits and does not employ prophylactic measures of any sort.

Clinical Manifestations and Pathology.—Negro luetics present a peculiarity of type, or a greater frequency of certain types, than is usually found in whites.

(1) *Chancre.*—Twenty per cent of the author's cases showed chancre, principally characterized by indolence of development. Extragenital chancres are extremely rare in the negro race.

(2) *Skin Lesions.*—The author quotes Hazen as saying: "Macular and maculopapular eruptions are not common in the negro." On the other hand, the annular lesion of early syphilis seems to be peculiar to the negro race. "The lesions are regular in outline, discrete, sharply-defined, and indurated. They vary in size from a few millimeters in diameter to the size of a quarter or larger. The lesion proper is definitely raised from the surrounding integument; often it presents a white scale, and encloses an area of apparently normal skin, which occasionally shows some increase in pigmentation. Lesions occur most frequently on the forehead, chin, about the alæ, and occasionally on the neck and trunk. Here again the indolence of the disease in the negro is characteristic.

(3) *Mucous Membrane Lesions.*—This type of lesion seems to be particularly common in the negro race, but the lesions themselves do not differ in degree from those appearing in white individuals, except perhaps in the frequently observed hypertrophic tendencies.

(4) *Condyloma Lata.*—Broad condylomata seem to occur more frequently in the negro, but do not differ from those observed in the white race. Personal hygiene probably plays an important role in their occurence.

(5) *Adenitis.*—Lymphadenitis, which in the white race is an important diagnostic factor, occurs so frequently in negroes as to be of little value in diagnosis.

(6) *Appendages.*—Involvement of the appendages seems to occur with equal frequency in both races.

(7) *Osseous Lesions.*—The concensus of opinion is that the osseous system is more frequently involved in the negro than in other races.

(8) *Visceral Involvement.*—As a rule the

circulatory, respiratory, gastro-intestinal and genito-urinary systems are not frequently involved in the negro.

(9) *Central Nervous System Involvement.*—The author has found few cases of tabes or general paresis, or signs of earlier involvement.

Congenital Syphilis in the Negro.—The majority of cases among negroes are acquired, probably due to the fact that congenitally syphlitic negro babies do not survive.

Diagnosis.—Syphilis in the negro may be diagnosed as in other races. Circinate or annular syphilids are more common in the negro than in whites and must be distinguished from certain other conditions, such as erythema multiforme, psoriasis, and tinea circinata. The most conclusive diagnostic factors are the finding of *Spirochaeta pallida* and the Wassermann test.

Prognosis.—The chances for recovery are not as favorable in the case of the negro as in that of the white, for the former only undergoes treatment when his lesions are acute, and is remiss at other times. On the other hand, the most fatal involvements of the central nervous system, tabes and paresis, are rare in the negro.

Prophylaxis.—The author recommends that the negroes be taught the use of prophylactic packages, that syphilis be made a reportable disease in all places, with severe penalty for failure to report cases, that free clinics be made available and treatment be compulsory. Such measures should include whites and negroes alike. It is difficult to teach the negro that sexual indulgence during the acutely infectious stages of the disease is wrong, and therefore public lectures, exhibits, pictures, etc., on the subject of sex hygiene are of less avail among the negroes than among the whites.

Treatment.—The response to treatment seems to be the same in both races. In spite of the negro's poor mouth hygiene his teeth are good, and his tolerance for mercury as good as that of other races.

Hart, T. S.: The Heart in Bronchopneumonia: Observations on the Activity of the Heart and its Response to Digitalis Made During the Recent Epidemic. *American Journal of Medical Sciences,* Nov. 1, 1919, clviii, No. 5, p. 649.

The author's observations were made in New York City. The cardiac activity was similar to that in uncomplicated typhoid fever. The cyanosis must be explained on grounds other than insufficiency of the right heart, as postmortem examination revealed no evidence of dilatation on either side. The fatal termination presented a picture of overwhelming toxemia, and those patients with chronic valvular disease withstood the toxemia of the pneumonia very badly. The normal heart, in individuals who developed pneumonia, did not show evidence of damage.

A study of the action and value of digitalis was determined. Two preparations were used, the tincture given by mouth, and "digifolin" (solution of digitoxin and digitalin), given intravenously. Both preparations were thoroughly tested and standarized. As soon as a reasonably certain diagnosis was made the routine method adopted was to begin with 25 minims of the tincture every four hours for 6 doses, and then to reduce the amount of 15 minims every eight hours. Modifications were made in accordance with the patient's manifestations during the course of the disease. If symptoms of toxemia developed very rapidly, or if patients were admitted in this condition, they received from 15 to 30 minims every four hours up to 3 or 4 doses of digifolin, intravenously. Then the tincture was usually substituted. Controls were made, from time to time, for comparison on cases selected at random, and in which no digitalis preparation was given, other therapeutic methods being identical in all respects. No difference in the course of the disease could be observed in the two series except by electrocardiogram. This method showed characteristic changes in those patients receiving digitalis; in two instances arhythmia developed, which proved to be due to a condition of partial heart-

block. No change in pulse-rate or in blood-pressure could be attributed to the drug. Some rates were below 100; others were more rapid, but failed to diminish on increase of the drug. The terminal increase of heart-rate in fatal cases was identical in both series of cases. Two former patients with chronic cardiovascular disease with auricular fibrillation, who previously responded satisfactorily to digitalis, fell ill with influenza, and both developed the typical picture of pneumonias seen in the other cases. Both were given digitalis, and the circulatory condition improved. The heart slowed to half the rate, and appeared to be reasonably efficient. The patients died, one on the sixth, the other on the tenth day. In neither case was the heart-failure the apparent cause of death. In 4 instances, out of several hundred to whom digitalis was administered, heart-block was shown. All recovered and gave no evidence of subsequent ill effects following the use of the drug. In 1 case 465 minims (27.9 c.c.) of the tincture were given before partial heart-block appeared; in another an almost identical heart activity appeared after 230 minims (13.8 c.c.). Other patients received larger amounts but did not show evidences of heart-block.

Digitalis should be given in moderate amounts, and one should approach complete digitalization gradually.

Brown, T. R., and Gaither, E. H.: Some Notes on Syphilis of the Digestive Tract. *American Journal Syphilis,* July, 1919, iii, No. 3, pp. 376-383.

Syphilis plays a much more important role in pathological conditions of the gastro-intestinal tract than is commonly supposed. Paraluetic (tabetic) manifestations of the digestive tract are sometimes incorrectly diagnosed as gastric or duodenal ulcer, local peritonitis, gall-stone colic, acute appendicitic, etc., due to the similarity of symptoms.

In hereditary syphilis, intestinal ulceration with diffuse infiltration of the wall, sometimes associated with gummata, and especially with diarrhea, constitute a syndrome easily confused with that of intestinal tuberculosis.

In acquired syphilis, the intestinal symptoms are not so marked, except in the tertiary stage, in which intestinal ulceration appears. The usual symptoms are persistent diarrhea, tenesmus, the presence of blood and pus in the stools, occasionally hemorrhages. The diarrhea sometimes alternates with constipation.

The buccopharyngeal symptoms of syphilis, especially in the primary and tertiary stages, are also apt to be misinterpreted by the diagnostician.

The tertiary lesion of the mouth and pharynx include syphiloma of the lips, sclerotic glossitis of luetic origin, frequently associated with gummatous glossitis, and various lesions of the palate, pharynx and tonsils.

The symptomatology of tertiary spyhilitic involvement of the liver greatly resembles that of cirrhosis and of carcinoma of the liver, and the frequency of incorrect diagnosis has led the author to employ mercury and iodids experimentally in all cases suggesting liver tumor, even in the absence of a positive Wassermann reaction.

In acquiring syphilis gummata may be found in the pancreas, but the etiological significance of syphilis in chronic interstitial pancreatitis is open to doubt.

Various groups of digestive symptoms may be noted:

(1) *Those Simulating Carcinoma—with Palpable Tumor Mass*—The premonitary symptoms, are a feeling of fullness and distress, eructations and indefinite distress. Later pain is noted, dependent upon, or independent of the amount and character of the food ingested. Heart-burn and nausea are occasionally found, and vomiting is marked if the tumor mass is at the pyloric end. If the mass ulcerates occult blood may be found in the stools. The appetite is variable, and anorexia may appear. Constipation is common. Due to the diminished in-

take of food, the patient may be emaciated.

One important diagnostic factor is the age of the patient. This condition is apt to appear far earlier than the accepted age limit for the appearance of carcinoma. The physical and laboratory findings are often not distinctive enough to justify a differential diagnosis. On the whole the possibility of luetic origin must be considered in cases of indefinite persistent digestive symptom which do not yield to treatment and where malignancy is excluded.

(2) *Cases Indicative of Ulcerative Types.*—Here again one finds vague abdominal discomfort, a feeling of fullness and distress, followed by pain, in this case apparently dependent upon food intake. Eructations and nausea, variable bowel function, with a tendency to constipation, and melena depending upon the extent of the lesion, are noted, closely simulating gastric and duodenal ulcer. The gastric findings are not distinctive. The luetic origin of the symptom-complex is shown by its quick response to specific treatment.

(3) *Indefinite Group.*—In this type the digestive complaints are of long standing, and may or may not depend upon the food intake. The pain is irregular in location, appearing at times in the appendix, or sometimes in the gallbladder region, the epigastrium, etc.

(4) *Nausea and Vomiting.*—In this group periods of absolute immunity alternate with attacks of distressing and persistent nausea and vomiting, at times apparently precipitated by nervous conditions. Patients with these symptoms must be distinguished from those with psychoneurotic tendencies. There is debility, exhaustion, and loss of weight, unaffected by treatment. The vomit is of a bilious nature. At times large quantities of pure mucus are secreted and evacuated, probably due to hyperactivity of the mucous membranes. The stomach symptoms are complicated by excessive salivation and nasal secretions, resembling the manifestations of hayfever. Constipation alternates with diarrhea. Because of the distressing effects of eating, anorexia is apt to appear, followed by emaciation and asthenia.

Periodic attacks of an intractable diarrhea in tabes dorsalis appear in rare cases. These cases, with otherwise typical findings, show, instead of the usual colonic crisis, periodic attacks of severe diarrhea. The author considers these atypical symptoms to be neurogenic in origin, representing either overstimulation of the vagi, or inhibition of the splanchnics.

In conclusion the author emphasizes the fact that inasmuch as the symptomatology of lues of the stomach may absolutely duplicate that of various functional or organic digestive diseases, the physical findings and previous history of the patient should be carefully studied for indications of luetic origin. In all suspicious cases an examination of the blood and spinal fluid should be made before a diagnosis is formulated.

Noack: Narkolepsie. *Neurologisches Centralblatt*, January 2, 1918, xxxvii, No. 1, p. 27.

A case of narcolepsy resembling those described within the last two years by Redlich, Henneberg, Mendel, and Jolly is presented in this article. The two main symptoms, the sleeping spells and the muscular relaxation when the patient laughed or became angry were extremely well developed. As in Westphal's and Gelineau's cases the sleeping spells appeared suddenly and without cause, and mental emotion seemed to have no influence on their frequency. Like Redlich's case, described in 1915, the patient was the son of an alcoholic. A hereditary taint was revealed in slight weak-mindedness. The history of the case obtained by the author showed

that the sleeping spells had extended over a period of years. While under his observation the patient had as many as six spells a day, lasting from five to forty minutes and resembling normal sleep. A fact of importance is that during this period, covering more than five weeks, nothing was discovered that would suggest epilepsy or hysteria, although some years before a diagnosis of epilepsy with peculiar sleeping fits had been made in the Bonn clinic.

DICKER, WILLARD W.: Syphilis in Heart Lesions. *Illinois Medical Journal,* November, 1919, xxxvi, No. 5, p. 235.

During the last year Dicker made a careful inquiry into the etiology of the decompensated hearts of individuals who entered his service at the Cook County Hospital in Chicago, and he describes in this article the manifestations of those who entered during about five months of that time.

There were 44 cases in all, and of these 17, or 38 per cent, proved to be syphilitic in origin, 10, or 24 per cent, were rheumatic, 7, or 15 per cent, were arteriosclerotic, 8, or 18 per cent, were renal, and 2 cases, or 4 per cent, were of fatty hearts.

The author calls attention to the fact that these statistics were all from *male* patients entering the County Hospital with cardiac decompensation. He does not mean to draw the conclusion that 38 per cent of all cardiac lesions are syphilitic and only 23 per cent rheumatic, because if these figures include women the rheumatic percentage would naturally be much higher. These figures, in the author's opinion, simply show that if lues accounts for so many cases in the County Hospital, it must also account for the many in private practice, and therefore a careful consideration of the nature of the syphilitic involvement is fully justified.

The most apparent lesion is in the aorta. Small areas of inflammation develop in the middle coat, and later extend into the inner coat. This produces a weakening of the vessel wall, which results in the dilatation. The aortic valves are involved later, giving rise to an aortic regurgitation, and subsequently the disease extends into the orifices of the coronary arteries, which are adjacent to the valves. When these two lesions are present the heart is permanently and badly damaged. In a large proportion of cases the heart muscle shares in the involvement, and this accounts for the failure of the heart to respond to treatment. Bearing these pathological changes in mind, the author rightly insists that if treatment is to accomplish anything, it is of the utmost importance to make the diagnosis before the aortic valves, coronary arteries, and myocardium, are involved.

Early aortitis gives rise to very indefinite symptoms, and it is not very often that one is able to make a diagnosis before irreparable damage is done; but in some few cases this can be done, and in these the future progress of the disease may be stopped by active antisyphilitic treatment.

The earliest symptom in many cases is pain; this may vary from a mere transient feeling of tightness about the upper part of the sternum to the excruciating pain of true angina. Many patients have no pain until late in the disease. The other symptoms are even more indefinite; they are vague complaints such as general weakness, shortage of breath, hoarseness, a dry cough, and slight cyanosis. Before the valves are involved, physical examination may show only a slight increase in the aortic dullness, and this is usually difficult to make out. A loud second aortic sound is described by some as an important aid in diagnosis. Later, when there are evidences of aortic regurgitation and aneurysm, the diagnosis becomes, comparatively speaking, an easy matter, but then as far as treatment is concerned it is of no avail.

The most valuable information, however, may be obtained from the *x*-ray; in this way a very slight dilatation may be detected. Of equal importance is a positive Wassermann reaction, although a negative Wassermann does not exclude the possibility that the condition is syphilitic. At this point, the author emphasizes the fact that one cannot say that a positive Wassermann determines the

diagnosis, but the absence of any other luetic lesions, and a knowledge of the frequency of involvement of the heart and aorta in latent syphilis, would lead one to strongly suspect an aortitis, if there were any symptoms or physical signs pointing to it.

The value of the therapeutic test in the diagnosis is well illustrated by the author in one of his cases, in which a man with a history of syphilis and a positive Wassermann had pain over the sternum with no other findings on *x*-ray or physical examination. This promptly cleared up under mercury treatment, although it had been present for many months, and resisted other forms of treatment.

The prognosis in cases of syphilitic heart disease, bearing in mind its pathology, is much worse than in the rheumatic variety. Once decomposition has set in, little or nothing can be done.

"The study of the effect of lues on the heart," says the author, "must lead us to the conclusion that the heart of every so-called cured syphilitic should be very carefully watched throughout his life and any abnormality should call for active treatment."

Tenney, C. F., and Rivenburgh, W. T.: A Group of Sixty-eight Cases of Type I Pneumonia Occurring in Thirty Days at Camp Upton. *Archives of Internal Medicine,* Nov. 15, 1919, xxiv, No. 5, p. 545.

This group consisting of colored troops arriving from overseas, many of the men having been ill several days before they were admitted to the hospital. With the exception of 7, who recovered shortly after admission, they were all treated with Type I anti-pneumococcus serum, receiving 100 c.c. every eight hours, day and night, until the temperature was below 100° F. (37.78° C.) or evidence of impending death made it advisable to discontinue it. The death rate was 14.7 per cent. A detailed tabulation of the cases is given, from which it is seen that in 8 empyema developed, including those cases in which pus was found in the chest at autopsy; in 2, pericarditis developed, with 1 recovery; in 1, meningitis; in 1, meningismus; in 1 case sterile fluid was found in the pleural cavity; 2 showed lung abscess; 1, mastoiditis.

Frauenthal, H. W.: Rheumatism in the Light of Modern Research. *New York Medical Journal,* Dec. 20, 1919, cx, No. 25, p. 1,024.

Until about ten years ago, Frauenthal points out, various kinds of pains were considered to be due to rheumatism, the underlying cause being thought to be the uric acid in the system. The conditions which were previously regarded as rheumatic may now be divided into two classes, about 70 per cent of them being due to various types of focal infection and about 30 per cent to disturbances of metabolism, *i. e.,* excessive food; too much of one kind of food, inability to digest certain kinds of food, etc.

Any of the following infective or septic processes affecting the system may produce an acute or chronic inflammation of the joints:

(1) Local suppuration in the mouth and nose, carious teeth; diseased gums and tonsils; disease of the accessory sinuses and middle ear affections.

(2) Acute or chronic infection of the genito-urinary tract.

(3) Puerperal sepsis.

(4) Any form or infection and disease of the gastro-intestinal tract.

(5) Sepsis in the bronchial and pulmonary system.

(6) Every known specific bacterium which has proved a source of arthritis-streptococcus, staphylococcus, pneumococcus, gonococcus, typhoid, *Streptococcus erysipelatis,* meningococcus, the bacilli of dysentary, etc.

(7) The exanthemata and infectious diseases common to childhood.

(8) Acute rheumatism, which is one of the best examples of acute synovitis. It is also associated with suppurative processes in the joints, as is naturally to be expected in an

affection which so often leads to malignant endocarditis and septicopyemia.

(9) The chronic granulomata, syphilis and tuberculosis.

(10) Many tropical diseases.

(11) Any lesion, however small or unexpected, which may lead to septicopyemia, whether acute or chronic, has the capacity to infect a joint.

A bacterial process may produce arthritis in two ways:

(1) By septicemia or pyemia, *i. e.*, the microorganisms themselves gain admission to the joint-tissue and thus excite active disease of the joint.

(2) As a result of the production of toxins in any local focus of disease (*i. e.*, not in the joint itself) and of this circulation in the blood current there is a tendency to the production of disease in any of the tissues of the body. If the vitality of any part has been undermined by over-use, injury, or exposure to cold, these toxins are most apt to excite inflammation in that part, and if that part is a joint, the result is a synovitis or arthritis. The author believes that whenever a "cold" is considered to be the cause of synovitis or arthritis, it must be remembered that in all probability the "cold" is only a contributory cause, and that the real cause must be sought in some septic focus in another part of the body.

Frauenthal is still unconvinced that errors of metabolism, *per se*, unaccompanied by bacterial disorders of a septic nature in the gastro-intestinal tract, are ever a cause of arthritis. In cases of toxic arthritis he also suspects some microorganism to be the exciting factor. The importance of focal infections as a cause of joint disease is not sufficiently appreciated at the present day, but the author feels "sure, that the teeth and gums as sources of infection are overestimated and (that) much harm is done by the promiscuous extraction of teeth owing to incompetent interpretations of *x*-rays."

The relation of pyorrhea to arthritis is described by the author as an infection occurring *around* the roots of the teeth or *at* the roots of the teeth where, after an invasion of streptococci, staphylococci or other pathogenic microorganisms, an inflammatory process is set up, from which the bacteria are carried by the blood stream and lymphatics through the system, finally producing an acute inflammatory process in one or more joints.

In Frauenthal's opinion, the so-called rheumatic conditions in children are most commonly due to the streptococcus or to other bacteria in the tonsils, adenoids and mucous lining of the nose and throat; at times the original infection is of so mild a character as to be overlooked. He also adds that it is surprising how frequently infected hemorrhoids, fistulas and abscesses of the rectum are foci from which infected joint conditions develop. He calls attention to a class of cases in which acute inflammation of the feet and an inflammatory condition in the larger joints are present in married women between twenty and forty years of age. The patients give negative Wassermann and gonorrheal fixation tests; a vaginal discharge is present, and often a laceration of the cervix uteri, which causes lymphatic absorption. Repeated smears of gonococci are negative. The feet are swollen, tender and painful. The patient has difficulty in walking; often the large joints are involved. These joint infections are said to be cured by douches of a solution of iodin and bichlorid of mercury.

Statistics show that from 60 to 80 per cent of the male population of cities acquire gonorrhea and that of these from 2 to 7 per cent have gonorrheal rheumatism. Kimball reports that out of 600 children admitted to the Babies' Hospital in one year, 70 had gonorrhea; in 10 arthritis developed. During the treatment of these cases the local infection must be eliminated before the arthritis can be expected to subside. In gonorrheal as well as in streptococcus infections, there is a great danger of involvement of the heart.

Before the routine Wassermann test was in vogue, the frequency of luetic arthritis was overlooked, most of the cases being regarded as tubercular. During the past fif-

teen years, Frauenthal found that more than 15 per cent of the cases of arthritus at the Hospital for Deformities and Joint Diseases (New York City) were due to syphilis. An incorrect diagnosis of these cases to-day he ascribes to faulty interpretations of the roentgenological findings and to failure to avail oneself of all the modern methods of diagnosis, particularly of the Wassermann reaction.

The author concludes the paper with a chapter on treatment in which he urges the necessity of eliminating the spreading foci of the disease in all cases of local infection. Local treatment of the joint must be given for the relief of pain, the prevention of joint deformity, and the restoration of function of the joint to normal. He advises the employment of salicylates, aspirin, novaspirin, acetates and citrates. Autogenous and mixed vaccines are not to be given during the acute manifestations of the disease. In chronic arthritis, he has obtained remarkable results with nonspecific protein antigens. These may sometimes give violent reactions (a temperature of 105° F., or 40.55° C.), but they need not be a source of apprehension.

The wonderful results obtained in the army during the war from the use of physical therapeutics has awakened the interest of physicians in these measures. Some of these are:

(1). Massage.

(2). Mechanical vibration with a regular stroke, which is more efficient in giving deep massage than the hand

(3) Baking by dry heat in a temperature of from 150° to 400° F. (65.55° to 186.66° C.), to produce congestion and promote elimination.

(4). Hydrotherapeutics—general baths in which the trunk and extremities are immerced, aerated baths, brine baths, sedative pool baths, whirlpool paths, contrast baths, hot and cold jacks, douches and showers, low pressure douches, needle baths, and showers.

(5). Electric light treatment as a substitute for the actinic rays of the sun.

(6). The galvanic, faradic, sinusoidal and Morton wave current, to stimulate the circulation and promote the absorption of exudates.

(7). Diathermia, for its action on metabolism.

(8). Electro-ionization with the lithium compounds, iodin, colchicum, or the salicylates.

DIAGNOSIS

Nicholson, N. C.: The Differentiation of Early Tuberculosis and Hyperthyroidism by means of the Adrenalin Test. *Canadian Medical Association Journal,* June, 1919, ix, No. 6, pp. 481-9.

There are cases which show the syndrome of fatigue, asthenia, loss of strength and weight, nervousness, tachycardia, vasomotor instability and slight elevation of temperature, but in which the physical signs, laboratory and *x*-ray findings, are insufficient for a positive diagnosis of tuberculosis. The author considers that many of these patients are suffering from hyperthyroidism and advocates the use of adrenalin tests to "elicit a state of hypersensitiveness of the sympathetic nervous system such as is present in conditions of hyperthyroidism." The cases tested comprised those patients with frank tuberculosis, those with hyperthyroidism complicating the tuberculosis, and those with definite hyperthyroidism only.

Technic of the Test.—The patient is kept in bed and quiet mentally and physically on the day preceding the test. The case history is studied for such symptoms as throbbing, nervousness, tachycardia, tremor, depressions, crying spells, struma, apprehensions, hot and cold flushes, cold hands and feet,

fainting spells, memory lapses, and gastro-intestinal disturbances. The physical examination is made for eye-signs (Joffroy, Moebius, von Graafe, and Dalrymple), thrills or bruits over the thyroid, dermatographism, edema of the eyelids, legs or hands, condition of the hair, etc.

The patient is kept under normal and unexciting conditions preceding the test. The test should not be given during menstruation. Two readings are taken at five minute intervals, of the systolic and diastolic blood-pressure, the pulse-rate and respiration, and all subjective nervous manifestations recorded. A hypodermic syringe is used, armed with a fine needle, and 0.5 c.c. (7.5 minims) of the commercial 1-1,000 solution of adrenalinchlorid infected subcutaneously into the deltoid region. Readings are made every 2½ minutes for ten minutes, then every 5 minutes up to one hour, then every 10 minutes for half an hour or longer. The reaction has usually passed off entirely by the end of 1½ hours at the most.

Conclusions.—"In a positive reaction there is usually an early rise in blood-pressure and pulse-rate of over 10 points at least; there may be a rise of as much as 50 points or more. In the course of from 30 to 35 minutes there is a moderate fall, then a second slight secondary rise, then a second fall to normal in about 1½ hours. One sees also an exaggeration of the clinical picture of hyperthyroidism, especially the nervous manifestations. . . . The following may all, or in part, be found: increase in any of the symptoms of which the patient may have complained." Vasomotor changes due to vasoconstriction may be followed in 15-30 minutes by a stage of vasodilation and flushing perspiration. There may be a slight rise in temperature and a slight diuresis. . . .

"In order to interpret a test as positive one must have a majority of these signs and symptoms definitely brought out or increased. . . . In other words, one must consider the entire clinical picture produced, in order to gain a correct interpretation."

Of the author's 18 cases belonging to the "clinical tuberculosis questionable" group, 10 reached positively to the adrenalin test, 8 negatively. In all of the groups the degree of reaction varied considerably.

Many patients show mild hyperthyroidism who have not been greatly annoyed by their symptoms and do not require medical or surgical treatment, but only rest and a well-regulated hygienic life. In the case of individuals suffering from both tuberculosis and hyperthyroidism the problem is more complex, for the extreme restlessness caused by the thyroid over-function renders the carrying out of a rigid rest cure for the tuberculosis extremely difficult. On the other hand, a surgical operation may be contra-indicated by the nature of the tuberculosis. The question as to which condition should receive predominant attention rests with the physician in charge.

". . . The adrenalin hypersensitiveness reaction affords us a means of early diagnosis of hyperthyroidism at a stage before the disease has seriously damaged the individual or perhaps incapaciated him. It thus allows us to appreciate an early mild hyperthyroid element in tuberculosis, should the two diseases exist concommitantly."

Wilkins, W. A.: The Diagnostic Value of the X-ray Examination in Pulmonary Tuberculosis. *Canadian Medical Association Journal,* April, 1919, ix, No. 4, pp 333-338.

X-ray plates and fluoroscopic examinations are valuable aids in diagnosis, but must not be considered as decisive as they are in cases of fracture or dislocation.

One possibility of error lies in the fact that even in non-tuberculous lungs some degree of pathology is found. Shadows are observed at the roots of the lungs, along the course of the bronchi and bronchioles, and at points of bifurcation wherever there is branching of the bronchial system and by lymphoid elements at the root of the lungs. There are normal findings, but their visibility on the plate increases with age, and with the extent to which they are involved by pathological processes. "When one con-

siders the impurities that are constantly being inhaled it is not surprising that the lymphatic system, associated with the respiratory tract, should almost always show some evidence of pathology, but it cannot be termed strictly an evidence of disease. Hence occupation, environment and age, apart from disease, will affect the degree to which these shadows are present. . . . When the areas drained by the lymphatics which filter through the glandular structures, or the glandular structures themselves are diseased, resulting in increased infiltration, these shadows will be increased in extent and density. . . .

"The quality of the shadow is a matter of extreme importance, varying with the age of the lesion. Old lesions are dense. In recent invasions, or in an active lesion, the shadow is generally light, feathery and small in extent, and a favorite situation is in the upper portions of the lungs, either supra- or intraclavicular."

Another kind of shadow consists in small, more or less circular, circumscribed and sharply defined shadows which may be found anywhere from the root of the lung to the periphery, and from the base to the apex. They seldom bear any relationship to physical signs or to the state of health of the individual. The blurring of one of these shadows may suggest the probability of active disease, but as a rule they merely represent an old healed lesion.

Cases may be divided into four groups: The *first group,* namely that in which evidences of tubreculosis are manifested by clinical examination and by the *x*-ray, includes the greater number of cases.

Advanced cases with copious signs and heavy shadows require no skill to recognize. The *x*-ray frequently reveals a greater extent of disease than the clinician believed to be present. This is due to the fact that the deeper lesions can not always be demonstrated by clinical methods. Yet even the *x*-ray cannot reveal all lesions completely and additional pathological factors may be discovered at autopsy.

The *second group,* including cases in which diagnosis is based upon clinical evidence alone, should be a small one. They are early cases and the lesions are situated superficially, or are too small to project recognizable shadows—*i. e.,* they can be discovered only with the aid of a microscope.

The *third group* comprises "cases in which diagnosis is based upon *x*-ray evidence, in the absence of physical signs in the chest. Some clinical evidence of disease is present, such as elevation of temperature, rapid pulse or cough, but the clinician . . . is unable to locate the site of the lesion by ordinary physical examination. However, it is unwise to establish a diagnosis of tuberculosis upon the *x*-ray findings alone, in the absence of corroborative clinical evidence."

The *fourth group* includes doubtful cases in which physical and *x*-ray examinations yield negative findings, but in which a definite diagnosis of tuberculosis is later established. This group is fortunately small.

The author says in closing that errors in *x*-ray diagnosis are seldom due to lack of evidence on the plate, but to lack of skill in interpreting the evidence. There is danger of regarding the normal pathology as an evidence of active tuberculosis. "No method of examination, nor combination of methods, will give rise to results 100 per cent correct. The margin of error will grow smaller with increasing experience, but it is too much to hope that it will ever disappear entirely."

McCrae, T., and Funk, E. H.: The Diagnosis of Chronic Pulmonary Tuberculosis. *Journal of the American Medical Association,* July 19, 1919, lxxiii, No. 3, pp. 161-5.

The author bases his study upon 1,200 cases admitted consecutively to Jefferson Hospital, all patients coming with a diagnosis of advanced pulmonary tuberculosis. Of the 134 necropsis, 7 were found to be nontuberculous (5.2 per cent). The cases wrongly diagnosed proved to be: cardiorenal, 19; pneumonic sequelæ, 9; bronchiectasis, 8; abscess of the lung, 8, chronic bronchitis, 16; neoplasm, 5; syphilis, 4; aneu-

rysm, 2; diabetes mellitus, 1; cancer of the rectum, 1; foreign body, 1; malingering, 1. The author gives a summary of the distinguishing factors upon which a differential diagnosis may be made in the above conditions:

(1) *Cardiac and Cardiorenal Disease* (19 cases).—A proper diagnosis might give a chance of benefit. The reason for error is careless examination. Failing health and strength, dyspnea, cough, and râles are wrongly interpreted. A study of the sputum would prevent mistakes in diagnosis.

(2) *Chronic Inflammatory Conditions in the Lungs,* usually associated with some form of pneumonic process (9 cases).—A mistaken diagnosis is due to the presence of blood in the sputum, cough, loss of weight and strength, fever, fine râles. Mistakes may be avoided by frequent sputum tests and by examinations for constitutional symptoms. Most cases come in the winter and were especially frequent following the recent influenza epidemic.

(3) *Bronchiectasis,* with marked fibrosis (8 cases).—The symptoms are similar in the two conditions. A study of the sputum is alone conclusive.

(4) *Pulmonary Abscess* (8 cases).—The symptoms—fever, emaciation and sweating—are misleading. The sputum test is alone conclusive.

(5) *Emphysema and Chronic Bronchitis* (6 cases), and

(6) *New Growth* (5 cases).—The symptoms of the two conditions are similar. The sputum test alone is conclusive.

(7) *Syphilis* (4 cases).—In the cases examined there were cough and expectoration (blood-tinged), hemoptyses, weakness, and loss of weight. Physical signs and roentgen-ray indicated tuberculosis. The fever was high, the sputum test negative. The Wassermann was positive, and after antisyphilitic treatment the symptoms disappeared.

(8) *Aneurysm, Anthracosis, Bronchial Asthma, and Empyema* (2 cases each).—Only frequent sputum examinations can prevent mistakes.

Conclusions: (1) A diagnosis of advanced pulmonary tuberculosis should be made only when tubercle bacilli are found in the sputum on at least two examinations.

(2) Physicians in tuberculosis sanatoria and hospitals should take particular care to verify the diagnosis in the case of all patients sent in with a diagnosis of advanced tuberculosis.

HAMMAN, J.: Physical Examination in the Diagnosis of Early Pulmonary Tuberculosis. *Pennsylvania Medical Journal,* March 1919, xxii, No. 6, pp. 353-5.

Physical examination may aim at detecting (1) the slightest lung changes, (2) signs of active pulmonary tuberculosis, (3) indications in cases not actively tuberculous that pulmonary involvement may later develop.

Changes may be recognized by altered percussion note, altered breath sounds and intensified breath sounds. These signs are usually discovered near or at the apices, as changes are particularly common in these areas and are more readily detected there.

In estimating the importance of changes the general physique of the patient must be taken into consideration. "If robust, healthy man shows a little dullness and harsh or blowing breathing at an apex, we disregard the findings; if the same patient should come complaining of a recent hemoptysis, we would view the case in another light." Physical examination can not therefore be assigned any absolute, but only a relative value. Other clinical facts must also be considered. The exception is the presence of râles limited to the apex, "which is an almost absolute indication of pulmonary tuberculosis, provided the general evidence points to the disease."

In military medical examinations the problem is to exclude from service not only those with active lesions, but also those liable to develop the disease due to the exposure and hardship of camp life. These include: "(1) those with no, or only slight pulmonary changes to percussion, auscultation and roentgen-ray examination, (2) those with more

marked pulmonary changes, (3) those with definite pulmonary changes."

Dr. E. H. Funk in his discussion of the above article (pp. 335-6), says: "The stethoscope must be depended upon largely in the diagnosis of early tuberculosis. . . . My own experience has been that percussion is the most difficult of all physical methods in which to acquire skill. . . . When the average physician obtains percussion changes the disease is usually beyond the incipient stage. . .

"The disease invariably starts at the apices and progresses downward. Abnormal physical signs at the apex which persist for any length of time are strongly in favor of tuberculosis. Abnormal physical signs at the base with normal physical signs at the apex are overwhelmingly in favor of some non-tuberculosis disease."

HEAD, G. D.: Atypical Clinical Types of Tuberculosis (Concealed). *Minnesota Medicine*, March, 1919, ii, No. 3, pp. 79-88.

The author considers the question of whether or not it is possible for tuberculous lesions to develop without producing in the individual any subjective or objective symptoms or evidence of undernutrition or chronic toxemia.

It is very difficult to obtain an accurate picture of the relation between the lesions and the outward symptoms. Individuals who report subjective symptoms cannot be exactly examined, even by fluoroscopic methods, whereas, in cases in which tuberculous lesions are found at autopsy, there is no way of judging whether symptoms were present at the time the lesion developed. Another source of error is the wide variation in individual reactions to pain and other manifestations. Symptoms which send one individual to a physician immediately may pass unnoticed by less sensitive or less observant individuals.

The author has taken as a basis for this study 163 cases which react positively to a subcutaneous diagnostic dose of tuberculin (Koch's O.T.). All of the cases were studied prior to the test for evidence of latent or active syphilis, cardiac disease, exophthalmic goiter, gastric ulcer, septic infection from tonsils, teeth, sinuses, etc. Only the cases proven by the subcutaneous tuberculin test to be free of all disease other than tuberculosis were chosen for this study. The following "concealed" types were found:

"*Cough and Cold*" *Group.*—These comprise the largest number of cases—34 per cent. The cough is usually very slight and not accompanied by expectoration. It may persist for years and be aggravated by exertion or exhaustion, being at other times described only as a "little nervous cough." Many subjects are well developed and muscular. The majority, however, are thin and long-chested, with high cheek bones and slender limbs. Dyspneic attacks are sometimes found. Such subjects are liable to colds. Hemorrhages may take place occasionally and suddenly. Definite physical signs are usually absent. Even *x*-ray studies do not distinguish between healed and active lesions. Subcutaneous tuberculin tests are the only reliable diagnostic means in such cases.

"*Abdominal Distress*" *Group.*—About 20 per cent of the cases fall into this group. The patients complain of gastric symptoms, eructation, heart-burn, undefined abdominal pains, especially after eating heavy, rich foods. Laxatives usually give relief. Hyper- or sub-acidity may exist. Nausea is sometimes present, and occasionally persistent. There is gradual but progressive loss of weight. Eating when fatigued or excited aggravates the gastric symptoms. Objective findings are lacking, other than ill-defined abdominal tenderness. Surgical treatment is ineffective. Tuberculin tests, while proving the presence of tuberculin in the body, do not indicate the location of the disease. The author thinks that many of these patients "suffer from malsecretions and circulatory disturbances in the stomach due to chronic tuberculous toxemia the lesions being situated in the lungs, mediastinal lymph-glands or pleuræ." The presence of tubercle bacilli in the stools

does not prove that the lesion is in the intestines as the diseased mucus may originate in the stomach. Tuberculin treatment is of curative as well as diagnostic value.

"*Chest Pain*" *Group.*—This group comprises about 15 per cent of the cases. Chest pains are usually of long duration—sometimes as long as 10 or 15 years. They recur in the spring and winter, when the vital resistance is low. The location of the pains varies widely, being referred to the mid-sternum, scapula, back or spine, shoulder, arm, neck, or upper abdomen. The location changes often. Sometimes a dry pleural friction rub can be heard. In some cases this sign is present on one examination and absent the next. It may or may not be aggravated by cough. The pain is increased after violent or prolonged exertion.

"*Physical and Nervous Exhaustion*" *Group.*—This comprises about 18 per cent of the cases. There is a variety of symptoms, the most marked being persistent fatigue, and insomnia. Some cases show a history of an earlier nervous breakdown. Teachers, stenographers, and other indoor workers make up the majority of this group. They suffer from headache, backache, indigestion, constipation, cold extremities, crying spells and depression, exhaustion under mental effort, dizziness or faint spells, air-hunger, eye-ache, dysmenorrhea, etc. Children are often sufferers. They lack endurance because their vital force is sapped by a tuberculous toxemia. In cases of young women there is often a history of previous operation for pelvic displacements, ovarian disease, ulcer of the stomach, chronic constipation, etc. There is progressive loss of weight and malnutrition. There is frequently a history of exposure to tuberculosis during childhood.

The most peculiar type is that of "air-hunger." This symptom is often diagnosed as hysteria because no other rational explanation can be found. The patient takes deep breaths and feels a hunger for air. Examinations show no organic disease outside of the tuberculous lesion revealed by the tuberculin test. Symptoms often point to neurasthenia and the disease is often diagnosed as such.

"*Mal-nutrition*" *Group.*—These patients comprise about 5 per cent of cases. The chief complaint is loss of weight and strength. There is no pain, no cough. Sometimes the patient is of large frame and stocky build. The pulse is little affected, and a physical examination reveals no signs of organic disease. The only diagnostic test is the subcutaneous tuberculin injection.

Those patients with persistent pain in the back make up another small group (about 5 per cent). There is ill-defined tenderness and hyperesthesia of the skin in the region of the pain. The pain follows the course of the ureter into the bladder. Frequent micturition is often an associated symptom, and nocturnal urination is sometimes noted. The urine is usually negative, except for the presence of occasional pus-cells or blood-cells, but tubercle bacilli may sometimes be found. The pain in the back in these cases is probably an expression of early renal tuberculosis, unilateral or bilateral.

In conclusion the author urges the diagnostic value of the tuberculin test, as being as specific for tuberculosis as the Wassermann test is for lues. The tuberculin test does not always indicate the location of the lesion, but by proving the presence of tuberculosis in the body it enables the physician to map out the general treatment and manner of life which will prove beneficial to the patient and increase his resistance to the disease.

Dr. C. L. Green, in his discussion of Dr. Head's article (pp. 86-87), mentions Stillwell's description of congenital asthenia and adds: "He laid great stress upon the fact that those of the congenitally asthenic type —and they are also of the visceroptotic type, the low-lying stomach, heart, etc.—were peculiarly liable to infection and peculiarly susceptible to tuberculous infection. There is no doubt about that. It is the most fertile soil for the implantation of the tubercle bacillus. . . . During the past eight or nine years . . . we found in that type of cases an astonishingly large percentage of tuberculous lesions . . .

"It has been sufficiently established . . . that this congenitally asthenic type is seen in families as the primary and original type, but such children acquire tuberculous infection much more easily than others."

BARR, ED.: A Few Points on Examination of the Chest for Tubercoulosis as Given in Military Training by Major Estes Nichols. *Kentucky Medical Journal,* June, 1919, xvii, p. 24.

The author aims at differentiating between acute, chronic inactive, chronic active tuberculosis and acute respiratory colds which may produce misleading pulmonary signs.

Observation.—The patient should stand, stripped to the waist. The observer should note the conformation of the chest and depressions, and whether or not either side shows lagging expansion, especially in the apex. Such apical involvement shows that the tissue which normally gives motion to the lung has been replaced by connective tissue which does not move. This may suggest tuberculosis but not the degree of involvement.

Percussion.—The observer should begin with the normal percussion note for the individual over the normal vesicular area, the axilla, and percuss upward. The patient should sit easily with his arms folded, and his muscles relaxed for the examination of the back. The observer should begin with the intrascapulor region.

Errors are possible. For instance, a deep percussion over the base of the right lung causes a normal dull note, and by deep percussion on the left side, one obtains a hyperresonant note. If the observer began percussion over the base of the left lung and obtained this hyperresonant note and then changed to the right and obtained a dull note, he would suspect a tubercular infiltration of the base of the entire lung, whereas both might be normal.

It is also necessary to allow for the muscle dullness in normal cases. This may be confused with apical dullness if the patient's position is not good.

If the isthmus is found to be abnormally narrow, (the normal width being about 2 inches, slightly wider on the left side than on the right) this symptom, in conjunction with the lagging expansion, points to tuberculosis of the chronic type. It can be distinguished from the acute form, for in the latter there would be congestion instead of contraction. The type, whether active or inactive, may be diagnosed by *auscultation.* Prolonged expiration, roughened, bronchial, vesicular breathing due to contracted tissues indicate a chronic form of the disease. If, at the end of expiration, the patient coughs, and during the next inspiration a persistent shower of fine râles is heard, the active type is indicated. Roentgenographic examinations are here of little value.

Hilus tuberculosis is identified with certainty only by D'Espine's sign: The observer begins at the first dorsal spine and auscultates the spine while the patient whispers, loudly. The observer notes the place where the transmitted sound is much diminished, which is about the sixth dorsal spine. If the voice is carried below this point with distinctness the observer should auscultate a triangular area on either side. If hilus disease is present the voice will be carried out over a triangular area in this region, on either side. Roentgenograms should be made of this area. Percussion notes show but little change, and few râles can be distinguished.

MEAKINS, J.: Prolongation of the "S-T" Interval of the Ventricular Complex as Shown by the Electrocardiograph. *Archives of Internal Medicine,* Nov. 15, 1919, xxiv, No. 5, p. 489.

Meakins reports on a series of 26 cardiac and 10 diabetic patients in whom a prolongation of the "S-T" interval on the electrocardiographic tracings was found to be present. A study of these cases showed that this phenomenon was intimately associated with left-sided preponderance in the cardiac

group. In the diabetic group this prolongation was more apt to be in evidence when the patient was on a low calory diet, and became less marked when the diet was more liberal. Most of the patients complained of various degrees of precordial pain, sometimes amounting to typical angina, in spite of which none of them died from cardiac failure, although many of them had been under observation for some years. From a study of the patients, Meakins also concludes that prolongation of the whole ventricular systole may occur without definite evidence of injury to the bundle of His or its branches, and that prolongation of the Q-R-S interval occurs with left-sided hypertrophy.

Warfield, L. M., and Smith, F. M.: Studies on Irritable Heart. II. Etiology of Irritable Heart. *Journal of Laboratory and Clinical Medicine,* Nov., 1919, v, No. 2, p. 75.

The term "irritable heart" is used by the authors in preference to "effort syndrome," "neurocirculatory asthenia," or "neurocirculatory myasthenia" to denote a group of symptoms brought out only by effort and found in connection with a number of diseases. The characteristic symptoms develop by exertion, which is far less severe than that required to bring out some or all of the same symptoms in a normal person. These symptoms are found typically in such different diseases as chronic malaria, cirrhosis of the liver, chronic focal infection, hookworm infection, pulmonary tuberculosis (early), exophthalmic goiter, and as a result of severe infection with the *Streptococcus hemolyticus* (empyema), etc.

The group of symptoms denoted by irritable heart includes: breathlessness, pain, exhaustion, giddiness, and fainting, also, less frequently, palpitation, headache, lassitude, coldness of the hands and feet, irritability of temper, sleeplessness.

Of 275 cases showing these symptoms observation showed 33 cases to be normal; there were 78 cases of hyperthyroidism, 94 of pulmonary tuberculosis, 4 of irritable heart, 4 of cirrhosis of the liver, 41 of bronchial asthma. In true cases of irritable heart serious illnesses were excluded as an important etiological factor. The neuropathic element played an important part. The symptoms may be caused by some slow chronic poison acting on the nerve- and muscle-cells. The victims seem to be "constitutionally defective." The true irritable heart shows one factor not usually found in other cases, that is, a history of disturbance dating back for years with no definite cause.

Wang, Chung Yik, and Crocket, J.: Diagnosis of Tuberculosis by the Complement-deviation Method. *British Medical Journal,* July 5, 1919, pp. 7-9.

The authors report various attempts, based on Bardet's phenomenon, to determine whether in tuberculosis, as in syphilis, a diagnosis of the disease can be established by the complement-deviation method. The subject was first studied by Wassermann.

The outcome of the author's cases showed that in from 60 to 90 per cent of tuberculosis cases antibody was demonstrated in the blood, which, in the presence of tuberculous antigen, could inhibit complement. In 30 per cent a similar reaction, resulting in absorption of complement, was obtained with normal serum, but more often with luetic serum. Where a positive reaction was elicited, the amount of complement fixed was usually small. Therefore diagnostic significance must be ascribed to the tests. The authors have tried to elaborate a technic admitting of practical application.

Requisites for the Test

(1) *Tubercle antigen*—This consists in the bodies of tubercle bacilli after the fatty substance has been removed by Wang's method. A good growth of bacilli are necessary for the preparation. This is obtained by inoculating a 5 per cent glycerin veal broth (standarized to +5) with a young egg culture,

preferably two or three weeks old. The amount of the broth medium should be from 200 to 300 c.c. This is kept in a conical liter flask. The growth is started on the surface, one flask with the human type, one with the bovine type. When (10 week) scum is seen, the culture is ripe for use. If no good growth appears, sub-inocculation by transplanting a piece of surface growth to fresh broth is necessary. The growth is transferred to a bottle, and dehydrated with absolute alcohol, repeatedly changed. After the final washing the alcohol is replaced with ether, in the amount of 100 cm. to 10 grams of wet bacilli. The bottle is shaken for two hours in a mechanical shaker, at a speed of 120 strokes per minute, then the fluid is centrifuged at a high speed. The residue is treated with chloroform in the same amount, and shaken. Before the fluid is withdrawn for the centrifuge it is mixed with three volumes of ether and shaken for two hours. Then it is centrifuged. The process is repeated alternately with fresh ether and chloroform until five extractions are completed. The residue is dried and stored in the dark. The fluid antigen is prepared for use by grinding 100 mg. of the residue with 3 c.c. of saline, in a mechanical mill over night. Then the fluid is drawn off and the flasks and balls in the mill are washed with repeated changes of saltine. The washings are pooled and enough saline is added to make 100 c.c. The antigen is preserved in 0.5 per cent phenol and kept cold.

(2) *Syphilitic Antigen*—This is an alcoholic extract of the human heart, with or without the addition of cholesterin. For use the extract should be allowed to float on the saline for 10 minutes before it is mixed.

(3) *Patients' Serum*— (a) Blood is collected as for a Wassermann test from an arm vein. After separation the serum is heated at from 55°-56° C. for two hours. It is important that it be heated on the day of the test, as on standing it may develop anti-complementary power, whether or not it has previously been inactivated.

(b) When the above procedure is impossible, sufficient blood for the test may be obtained by the drop method from the finger: The thumb, after being bathed, is deeply pricked and the blood allowed to flow into Wright's capsule or a small tube, until 0.5 c.c. or more are collected. The separated serum is inactivated as before, but here, to prevent loss of fluid during heating, the tube is closed with a rubber cap.

(4) *Blood Suspension*—This is prepared from defibrinated ox-blood, which, at the final washing, should be spun at a fixed speed for a definite time, so that approximately the same amount of blood is obtained each time. This is important, as unless the strength of the amboceptor is estimated at each day's test the hemolytic titer must vary according to the strength of the suspension and therefore according to the thickness of the blood. For this reason it is necessary that the titer of amboceptor be determined from time to time against a working dose of blood of fixed concentration, in the presence of excess complement—*i. e.*, 5 minim hemolytic doses. For use a 1 per cent suspension is made up, sensitized at room temperature with from 8 to 9 M.H.D. of amboceptor.

(5) *Complement*—Guinea pig serum from 4 to 18 hours old is used. After the animal is bled, an examination of the organ is made, and if evidence of disease—especially tuberculosis— is visible to the naked eye, the serum is rejected.

Technic

First stage—As a preliminary to the test the M.H.D. of complement is ascertained as follows: With a graduated 1 c.c. pipet, 0.1 c.c. complement is measured into 2.9 c.c. saline (dilution 1-30). To the row of tubes the following doses of solution are added: 0.05, 0.10, 0.15, 0.20, 0.25, 0.30 c.c. Saline is added to equal bulk. This is titrated against 1 c.c. of a 1 per cent suspension of blood previously sensitized with from 8 to 9 M.H.D. of amboceptor. The tubes are incubated at 37° C. for one hour and the M.H.D. noted.

Final stage—The titer of the complement is now known, and the neat guinea pig serum is diluted as follows:

"If M.H.D. complement (dilution 1-30) is 0.10 c.c., 1 volume serum mixed with 29 volumes saline.

"If M.H.D. complement (dilution 1-20) is 0.15 c.c., 1 volume serum mixed with 19 volumes saline.

"If M.H.D. complement (dilution 1-15) is 0.20 c.c., 1 volume serum mixed with 14 volumes saline.

"If M.H.D. complement (dilution 1-12) is 0.25 c.c., 1 volume serum mixed with 11 volumes saline.

"If M.H.D. complement (dilution 1-10) is 0.30 c.c., 1 volume serum mixed with 9 volumes saline.

A serum giving a weaker complement value than the last should not be used. It will be seen that 0.10 c.c. of each of the above dilutions contains 1 M.H.D. of complement for each of serum. Three tubes are set up:

Complement	Tube 1	Tube 2	Tube 3
	0.20 c.c. 2 M.H.D.	0.40 c.c. 4 M.H.D.	0.40 c.c. 4 M.H.D.
Saline about	2 c.c.	2 c.c.	2 c.c.
Syphilitic antigen		1 dose	
Tubercle antigen			0.20 c.c.
Patient's serum	0.20 c.c.	0.20 c.c.	0.20 c.c.

These are incubated for ¼ hour at room temperature, then for ½ hour at 37° C., followed by ¼ hour at room temperature. Then blood is added as follows:

	Tube 1	Tube 2	Tube 3
1 per cent blood sensitized with from 8-9 M. H. D. amboceptor	1 c.c.	1 c.c.	1 c.c.

After the blood is added the tubes are again incubated at 37° C. and the result is taken when the first control tube shows complete hemolysis (from 10-15 minutes). Donald's drop method may also be used.

Interpretation of Results

A negative serum is indicated by complete hemolysis in the third tube (containing tuberculous antigen) when the first control tube is clear.

Positive serum is denoted, where hemolysis is complete in the first and second tube, by the absence of hemolysis or only partial hemolysis in the third tube. The strength of the reaction is measured by the degree of hemolysis in this differential tube.

(a) strong positive (+++) — complete absence of hemolysis
(b) moderately positive (++) — partial, slight hemolysis
(c) Weak positive (+) — partial, but considerable hemolysis
(d) doubtful positive (?) — almost complete hemolysis

When inhibition of complement by serum is observed in both antigen tubes (second and third), it is necessary that the serum be further tested, in order to eliminate possible false positive reactions. To distinguish a tuberculous from a luetic reaction, it is necessary to remove the Wassermann reaction. Heating also removes part of the tubercle antibody and is therefore not a practical method. The following method is reliable:

The suspected serum, whether or not previously inactivated, is mixed with an equal amount of saline in the tube, and 2 or 3 drops of chloroform are added to each c.c. of the mixture. The tube is vigorously shaken for from 10 to 15 seconds and placed in a water-bath at 55°-56° C. for 15 minutes. For use, the supernatant fluid is drawn off, and tested as above, except that here the quantity representing one dose is 0.4 c.c. (i. e., .2 c.c. neat serum). From 10 to 20 minutes after the sensitized corpuscles have been added, the results are read. Where less hemolysis is observed in the tuberculous antigen tube than in that containing syphilitic antigen, the serum is tuberculous, as well as luetic. If the reverse is true, the serum is probably only specific, not tuberculous.

The authors tested 104 tuberculous subjects and 220 controls, and the method was found to be satisfactory.

BACTERIOLOGY AND PATHOLOGY

Broders, A. C.: Tuberculosis Associated with Malignant Neoplasia. *Journal of the American Medical Association,* Feb. 8, 1919, lxxii, No. 6, pp. 390-94.

Rokitansky taught that tuberculosis and cancer are not incompatible, but that an antagonism exists between the two conditions. Later writers tend to disbelieve this opinion, and urge the injection of tuberculin in cases of cancer. Dabney based his view upon the fact that tuberculin therapy causes lymphocytosis in mose cases, and that as lymphoid activity is an essential factor in the immunity process of artificially engrafted cancer any treatment which brings about a condition of lymphoid activity would tend to inhibit cancer.

Statistics show that carcinoma is found more often in non-tuberculous than in tuberculous persons, the proportion being about 3-1 in favor of the former. Tuberculosis is also found twice as often in noncarcinomatous as in carcinomous individuals. "Moak, quoting Lubarsch, mentions five possible combinations of cancer and tuberculosis:

"(1) Simple coincidence, the diseases having no apparent action upon each other.

"(2) Metastatic carcinoma developing secondarily on a recent or old tuberculous focus.

"(3) A tuberculous infection becoming engrafted on a cancer in full evolution.

"(4) Chronic progressive tuberculosis on which develops a cancer.

"(5) Simultaneous development of both cancer and tuberculosis."

These conditions are rarely found combined in certain organs, such as the esophagus, stomach, ileum, rectum, salivary glands, lungs, ovary, thyroid and pancreas. The author found only 5 cases in which tuberculosis and cancer of the stomach were combined. "The two diseases seem to select different anatomic points of origin, and by a metastatic process through the lymph or blood stream they meet at the starting-point of one or the other, or at some point remote from their field of origin, such as the lymphatic glands."

Some tissues or organs seem to be susceptible to malignant neoplasia or to tuberculosis, while others are, to a large extent, immune.

The author gives tables of cases studied in the Surgical Pathologic Laboratory of the Mayo Clinic, showing the coincidence of the two diseases and their relative frequency in various localities of the body.

"The fact that active tuberculosis occurs most frequently in persons under 45, and malignant neoplasia, especially epithelial tissue malignant neoplasia, most frequently in persons over 45, does not prohibit the association of latent and healed tuberculosis with malignant neoplasia."

In the author's "series of 20 cases the two conditions were associated in the same microscopic field 7 times (35 per cent)."

Cheney, E. W.: A Study of the Microoganisms Found in Merchantable Canned Foods. *Journal of Medical Research,* July, 1919, xl, No. 2, p. 177.

The author thus summarizes his work: Seven hundred and twenty-five cans of merchantable foods in prime condition were carefully examined for bacteria, moulds and yeasts. The range of materials was wide, including the usual market brands of meat, fish, vegetables and fruit. All samples examined were purchased in the open market. Before analysis each can was incubated at 37° C. for at least ten days. Special precautions were taken to exclude outside contamination, during examination, and particular media were used to assure the growth of any organism that might be present in the sample.. Fifty-eight out of seven hundred and twenty-five, or 8 per cent of these cans, were found to contain living microorganisms. Not all foods contained organisms, some being found always sterile, some with a constantly low percentage, others with a high percentage of cans containing living organisms. There was a uniform average found throughout for each food, vegetables being sterile or showing only a small number of cans containing viable organisms (8 per cent), fruits showing a considerably lower number (3 per cent), fish and meats varying from 10 to 20 per cent. The organisms isolated constitute a sharply limited group of resistant spore bearers, including the *Bacillus subtilis mesentericus* group, the related thermophils, an anaerobe, four common species each of *Aspergillus* and *Penicillium,* and two borderline yeasts. No pathogenic organisms were found. The bacteria were associated chiefly with the meats, while the moulds formed the sole flora of all the fruit cans found to contain living organisms. Thermophils were found only in crab and lobster. There was evidence to suggest that in certain foods the bacteria and moulds had persisted through the processing, and that the usual methods of processing must be improved to obtain actual sterility in these foods.

Walker, I. Chandler, and Adkinson, June: Types of Streptococci Found in the Sputum of Bronchial Asthmatics. *Journal of Medical Research,* July, 1919, xl, No. 2, p. 229.

The authors studied sixty-five different specimens from fifty individuals. Hemolytic streptococci were recovered from forty-six of the fifty patients, and in thirty-five of the sixty-five sputums this type predominated, while in one it was in pure culture. Non-hemolytic streptococci were recovered in thirty-seven of the fifty patients, predominating in twenty-four of the sixty-five sputums, and appearing in pure culture once. In three specimens the hemolytic and non-hemolytic strains were present in about equal numbers and in one only was no streptococcus found. In this instance the *Staphyloccus pyogenes aureus* was the only organism found.

The streptococci were classified according to their ability to produce fermentation with the three sugars, salicin, mannite, and lactose, according to the method of Holman. It was found that practically all the hemoly-

tic streptococci were included in the four types, *subacidus, anginosus, pyogenes,* and *infrequens,* while practically all the non-hemolytic streptococci belonged to either the *ignavus, salivarius, mites,* or *non-hemolyticus I.* It was suggested that in doing the skin tests it would be well to include the protein of these types rather than the protein of one type alone. Autogenous vaccines were commended, but it was remarked that they should be made at frequent intervals, since the types of organisms present in the sputum are not constant, and therefore there is a chance that some vaccines may not contain the particular organism which is causing symptoms.

Berry, F. B.: Report of Three Cases of Combined Tumors of the Kidney in Adults. *Journal of Medical Research,* September, 1919, xl, No. 3, 459.

Berry records the cases of 3 adults from whom large kidney tumors were removed, with fatal results in two cases; the third, a man of seventy-two, made an uneventful recovery. The first proved to be a hypernephroma or adrenal cell carcinoma and a fibrosarcoma of the kidney, the second a papillary adenocarcinoma and fibrosarcoma, also of the kidney, and the third an adrenal cell carcinoma and leiomyosarcoma. The third, in which the sarcoma was of the smooth muscle type, precluded the possibility of its being merely overactive stroma, and the author is inclined to place the first two in the same class with the third and regard them all as true combined tumors.

Young, Edward L.: Silent Renal Calculi: *Boston Medical and Surgical Journal,* Nov. 13, 1919, clxxxi, No. 20, p. 573.

The author undertook this study in order to determine, (1) how frequently silent renal calculi occur; (2) what damage, if any, occurs to the kidney; (3) how long a stone, known to exist in the kidney, can be left without serious damage to the kidney; and, (4) whether damage can occur without showing signs in the urine.

For his material he looked over the records of almost 4,000 autopsies done at The Massachusetts General Hospital since 1896. Cases showing stones were studied macroscopically and microscopically as to the condition of the kidneys and this data correlated with the clinical symptoms and urinary findings. He finds only 45 cases showing stone in the kidney, or ureter, or both. Of these, 8 were operated on and known to have stone or renal damage. Thirty-seven were discovered in patients in the hospital for other conditions and had nothing to do with the cause of death. There was only 1 case with completely negative history and urinary findings, and normal kidney, both macroscopic and microscopic; but there were 4 cases without symptoms and with negative urine; 6 cases at autopsy were found to be without any damage to the kidney, and 15 with damage so slight as to be negligible. Of 2 patients with stones in the calices known to be present for six years, and who had had repeated attacks of renal colic, 1 had a normal kidney and the other a practically negative kidney.

Ureteral stones do more damage than do those of the pelvis or calix, and a small ureteral stone can do as much damage as a large one. Pus may be present during life without evidence of infection or damage being found at autopsy. There is no standard by which to decide which stones should or should not be operated upon. Ureteral stones almost always damage the kidney and should therefore be removed as early as possible.

Oertel, H.: The Essential Atrophy of the Pancreas. *Journal of Medical Research,* September, 1919, xl, No. 3, p. 289.

Oertel reports a pathological entity consisting of an essential atrophy of the pancreas, basing his description upon a study of 5 cases. The condition is characterized by a degeneration and collapse of the paren-

chyma which occurs independently of either vascular or inflammatory changes or an increase in fibrous connective tissue. The islands of Langerhans are involved in the process. Evidences of regeneration are frequent, but are overshadowed by the degeneration. The pancreas is diminished in size and weight, but the configuration of the organ is fairly well preserved. There may be some distortion, especially by greater loss of substance in the tail end.

Clinically the disease occurs in youth or middle age and is associated with a severe diabetes.

Oertel suggests that the process represents an exaggeration and perversion of the normal cycle of cell atrophy and regeneration which was first pointed out by Reitmann as occurring in the pancreas.

Graves, S.: Primary Lymphoblastoma of the Intestine. Report of Three Cases, One with Apparent Recovery after Operation. A plea for a Logical Classification of Tumors. *Journal of Merical Research,* September, 1919, xl, No. 3, p. 415.

Graves pleads for classification of tumors according to the histogenesis of their type of cells. He urges Mallory's definition of "lymphoblastoma" as meaning "a tumor of mesenchymal origin of which the cells tend to differentiate into lymphocytes, that is into cells of the lymphocyte series." This includes what are commonly known as "lymphocytoma," "lymphoma," "lymphosarcoma," and in most cases, so-called "round-celled sarcoma." Within this group, he has collected from the literature 246 primary tumors of the intestine. To this list he adds a very full clinical and pathological study of 3 further cases. Each presented a typical picture of chronic progressive intestinal obstruction, loss of weight, and a mass in the belly. One is in good health three years after the operation, one died with metastases in the lungs and elsewhere, seven months after operation, and the third apparently has a recurrence within the abdomen thirty-eight months after the operation.

In reviewing the literature, Graves shows that males are more often affected than are females, and that no age from one to eighty is exempt. Although the condition is usually regarded as fatal, it is seen from the cases reported in the last ten years that a number of patients have lived for years after operation without recurrence.

Ervin, D. M.: Relation of the Pancreas to Diabetic State. *Journal of Laboratory and Clinical Medicine,* Sept., 1919, iv, No. 12, p. 711.

By a series of experiments on dogs and rabbits the author showed that the external secretion of the pancreas, passing out through the duct, is a hydrolyzing enzyme, which changes the starch into glucose, while the internal secretion of the pancreas, from the islands of Langerhans, diverted into the portal blood to act as a synthetic enzyme, which converts the glucose into glycogen, in which state it it stored in the body. It is also shown that in animals from which the pancreas has been removed there is no interference with the normal rate of oxidation of glucose.

One set of experiments was performed to test the glucose consumption in the diabetic animal, that condition being produced by the removal of the pancreas. Results showed that the normal glucose consumption of the leg of a dog, determined by testing the blood-sugar from the femoral artery and femoral vein before the removal of the pancreas, was 0.036 per cent, and that the glucose consumption after removal of the pancreas, tested in the same way, was 0.035 per cent. In this and other experiments a hyperglycemia and glycosuria were produced by removal of the pancreas, while the oxidation remained normal. Another set of experiments, on rabbits, shows that if a glucose solution is introduced into the ileum, and the blood sugar is ascertained, the blood sugar will not rise appreciably unless the pancreas is removed, which

causes a marked hyperglycemia and glycosuria.

Summary.—Experiments show that a depancreatized animal, as long as six hours after depancreatization, develops a hyperglycemia and glycosuria, just as in the true state of pancreatic diabetes, yet consumes glucose at the same rate as the normal animal. The hyperglycemia and glycosuria are dependent upon the rate of synthesis of glucose into glycogen, and not upon interference with the normal rate of oxidation. The internal secretion of the pancreas is an enzyme, similar to the external, but diverted into the portal blood for the rapid synthesis of glucose into glycogen. The failure of its action is the cause of pancreatic diabetes. A diabetic is one who fails to synthetize the absorbed glucose into glycogen at a sufficiently rapid rate to prevent a hyperglycemia.

Austin, R. S.: Bovine Tuberculosis in Children. *American Journal of Diseases of Children,* April, 1919, xvii, No. 4, pp. 264-9.

The author analyzes 24 cases of tuberculosis in children and infants, with special reference to the bovine or hunger type of infecting organism in each case.

According to the tables of Park and Krumwiede, the bovine type of organism is found in 21 per cent of 368 cases of tuberculosis of all kinds in children under five years of age, and in 26 per cent of 177 cases in children from five to sixteen years. "In both groups about half the cases of tuberculous adenitis, abdominal tuberculosis, and generalized tuberculosis of alimentary origin yielded the bovine type of tubercle bacilli. . . . Scotch investigators have found a high incidence of bovine infection in Edinburgh in tuberculous children. . . . The proportion of bovine infections in tuberculosis of children in England, in Germany and in this country is apparently smaller than in Edinburgh.

The 24 cases comprising the basis of this study include infants and children ranging in age from 2½ months to 11 years. All but 3 cases had a fatal termination. "Determination of the bovine or human type of bacillus in each case . . . was based upon the result of inoculations of rabbits with known amounts of cultures. The growth of cultures on agar containing 5 per cent glycerine has given some indication as to the probable type of organism, but while strains ultimately found to be bovine have always grown scantily on this medium, some of the human strains have needed several transplantings on glycerine-agar before producing the typical relatively luxuriant growths. . . . Dorset egg medium, prepared with aseptic precautions and not sterilized after inspissation, has usually been found satisfactory for obtaining first growths and also for routine transplants; in one case, however, Petroff's medium yielding an initial growth when the Dorset egg medium failed. . . . The ages of the cultures when used ranged from 8 to 21 days. . . . Subcutaneous inoculation between the shoulders was made in all cases. . . . The dose in most of the animals was 10 mg. of culture suspended in physiologic sodium chlorid solution."

Two rabbits, controlling each other, were inoculated in every bovine case; in all but one of these cases both animals died in from 47 to 91 days and presented at necropsy generally disseminated tuberculosis, involving the lungs extensively. These rabbits showed a marked loss of weight, from 200 to 900 grams, by the time of death.

The rabbits inoculated with the human type of bacilli lived for over 100 days, and, when necropsied, showed no generalized lesions, rarely any visible lesion beyond the site of inoculation, and even here the tuberculous process was never extensive. These animals lost very little weight, or even gained. The two animals which died before 100 days, showed acute infection with other bacteria, and the tuberculosis was strictly limited. "Smears from rabbit lesions at necropsy usually revealed more bacilli in bovine type than in human type infections."

Each rabbit received a corneal scratch, into which was rubbed a drop of the bacilli sus-

pension used for inoculating the animal, the other cornea being similarly scratched and rubbed with saline solution as a control. The control scratch in all cases, and the test scratch in all rabbits with human type infection showed only a slight transient inflammatory reaction. Of the 15 rabbits with bovine type infection all but 3 presented marked persistent inflammation about the corneal scratch into which bacilli suspension had been rubbed; the other 3 showed no more change in the test scratch than did human type animals.

The author gives tables showing 7 of the 24 patients to be infected with the bovine type of bacillus. "In this series of cases it is not possible to draw any deductions as to the relative virulence of the two types of organisms, all but 3 cases being fatal. . . . There is also little indication here regarding higher or lower percentage of bovine infection at different age periods; it so happens that but 1 of the 9 patients under two years of age showed bovine infection, and that all 7 of the bovine type patients were under six years. Park and Krumwiede (*Jour. Med. Res.,* 1916, vol. v, 313) stated that up to 10 per cent of deaths in young children are caused by the bovine type of organism, also a large percentage of the rarer alimentary tuberculosis requiring operation or causing death. . . .

"In the 12 cases in which the primary focus is noted, it was found in 6 in the right lung, in 2 in the left lung, in 3 apparently in a bronchial lymph-nodule on the right side, and in 1 case in the intestine. One of the bronchial node cases, and the intestine case, had bovine infections.

"The corneal scratch test was not very satfactory. Although consistently negative in rabbits with human type infection, it was not always positive in bovine type animals."

It is generally considered that bovine infection is most likely to occur through cow's milk. The fact that, although all milk sold in Chicago is pasteurized, 7 of the 24 cases here studied were of the bovine type of tuberculosis, points to the necessity of home pasteurization of cow's milk.

The author concludes that while the cases studied are too few to justify definite conclusions as to the incidence of bovine tuberculosis in children, as regards age, site of lesion and fatal outcome, yet the results show the importance of this type.

Benjamin, Julien E, and Havre, Sidney J.: Further Observations on the Relation of Aortic Insufficiency to the Wassermann Test. *The Journal of Laboratory and Clinical Medicine,* Oct., 1919, v, No. 1, p. 47.

A report is made of 33 cases of aortic insufficiency unassociated with any other organic cardiac disease, from a clinical standpoint. These were obtained from examination of 44,018 recruits at Camp Riley, Kansas. Of the 33 cases only 11 per cent showed positive Wassermann reactions, while 57 per cent gave undisputed histories of rheumatism, 15 per cent gave questionable histories of rheumatism, and histories of frequent attacks of tonsillitis. Heretofore other careful observers have reported that from 60 to 84 per cent of cases of unassociated aortic insufficiency gave positive Wassermann reactions.

Dixon, G. B.: The Examination of Sputum for Tubercle Bacilli. *British Journal of Tuberculosis,* Jan., 1919, xiii, No. 1, pp. 22-25.

The Ziehl-Neelsen method of staining tubercle bacilli is the one most commonly used. "Herman's method is also useful when it is desired to bring out spore-like granules and branching forms. It consists in 3 per cent crystal violet in 95 per cent alcohol, mixed with 3 volumes of 1 per cent ammonium carbonate as mordant. After staining and washing, the slide is treated with 10 per cent nitric acid, then with absolute alcohol, and finally it is counterstained with 3 per cent chrysoidin."

Staining alone is not always conclusive, and therefore it is sometimes advisable to use a concentration process in addition, by which the bacilli can be more readily detected. If

tuberculosis is suspected, but no bacilli are found in the sputum at the first examination, Emery recommends the addition of 1 or 2 drams of sputum to about 4 ounces of a 1-20 solution of carbolic acid. This is to be well shaken at intervals during a few hours, and the resulting milky solution poured into a conical glass and allowed to stand for twelve hours, when a deposit will form. Part of this is removed and spread on a slide, in a thin film, and then dried, fixed, and stained. By this method the mucin and albuminous materials are coagulated and broken up, and the bacilli evenly distributed.

The antiformin method has also been highly recommended. Equal parts of antiformin and sputum are shaken together in a large test-tube until the sputum is dissolved. Five volumes of water are added, and the mixture again shaken. Equal volumes of acetone ether are added, and the test-tube shaken. Soon a cloudy ring will appear below the ether, which is collected by means of a pipet or a platinum loop, and prepared on slides. In films prepared by this method, Mathews found tubercle bacilli on 10 per cent. which had given negative results by other methods.

The objection has been made to this method that the variation in the amount of available chlorin in the test solution may influence the results. W. S. Davis therefore suggests treating the sputum with an equal volume of a saturated aqueous solution of common salt, shaking the resultant mixture well, and allowing it to stand for six hours. The surface is skimmed with a platinum loop and a smear made. The slide is stained for twelve hours in cold carbolfuchsin, slightly rinsed in tap water, and decolorized for fifteen seconds in acid-alcohol. Finally, it is counterstained.

Ellermann and Erlandsen recommend mixing 1 volume of sputum with ½ volume of 0.6 per cent solution of sodium carbonate in a corked glass, and incubating at 37° C. for twenty-four hours. The supernatant fluid is poured off, and the remainder centrifuged. Four volumes of 0.25 per cent sodium hydrate solution are added to the deposit, mixed well, and the fluid boiled. The resulting solution is again centrifuged, and from the deposit films are made and stained. This method is said to reveal the presence of tubercle bacilli where other processes fail. In one series of 945 in which the Ellerman and Erlandsen method was used, 205, or 21 per cent of instances gave positive results with sputum in which a single staining had failed to demonstrate bacilli. Of the 205 positive results, 146, or 71 per cent, were obtained after the first concentration process, which the author considers justification enough for the use of the method.

Goodpasture, Ernest W.: The Significance of Certain Pulmonary Lesions in Relation to the Etiology of Influenza. *American Journal of Medical Sciences,* Dec., 1919, clviii, No. 6, p. 863.

In studying the pathologic anatomy of this disease the author is convinced that an unknown virus produces characteristic lesions in the lungs and general intoxication with or without the coincidence of other infective agents. Many have studied this disease from a bacteriological standpoint, but they do not agree on the etiology. The pulmonary lesion which Goodpasture describes as having already been seen by McCallum, Wolbach, and Burnett, is a hyaline membrane found on the dilated alveolar ducts. It partially or completely covers the walls, and occasionally those of the subtended alveoli. The membrane is not uniformly distributed throughout the lung, and is not present within all the dilated air spaces. It is irregular in thickness, sometimes stratified, with occasional cells within narrow clefts. At its margins it may be continuous, with strands of fibrin, though it does not give the staining reactions for fibrin. It may completely fill an alveolus and is generally thickest over the angles of the wall. It is usually composed of fused necrotic mononuclear cells, or of strands of fibrin, or a mixture of both. A varied degree of hemorrhage, edema, cellular and fluid exudate, and focal necrosis of the alveolar walls may accompany this mem-

branous formation. It contains nothing specific in its elements of composition, but is constantly present in pulmonary inflammation, associated with influenza, and is most conspicuously seen in acute pneumonia of short duration; it is absent in other types. The membrane is not an end result typical of any demonstrated microorganism, and is usually found by ordinary methods to be bacteria-free.

Woglom, William H.: The Size of the Spleen in Immune Mice. *Journal of Cancer Research,* April, 1919, iv, p. 281.

Investigating, in a painstaking study, the question of the relation of the spleen to the immunity of mice to transplantable tumors, the author finds so many scores of error inseparable from the method of study employed that considerable doubt is thrown upon the conclusion of previous investigators that the spleen of the immune mouse is regularly enlarged.

Slye, Maud, Holmes, Harriet F., and Wells, H. Gideon: Primary Spontaneous Tumors of the Testicle and Seminal Vesicle in Mice and Other Animals. *Journal of Cancer Research,* April, 1919, iv, p. 207.

The authors, continuing their studies upon the incidence and inheritability of spontaneous tumors in mice, report the first observation of spontaneous tumors originating in the testicle of the mouse.

In 19,000 autopsies 28 such tumors were found.

All but one of these 28 tumors occurred in individuals of a single strain of mice and its hybrid derivatives, "thus substantiating the statement that heredity influences the incidence of tumor development in different organs or tissues."

The authors do not discuss this conclusion in its necessary relation to their statement that "4 (of the) tumors seemed to result directly from trauma."

Long, E. R.: A Study in Fundamentals of the Nutrition of the Tubercle Bacillus: The Utilization of Some Amino-acids and Ammonium Salts. *American Review of Tuberculosis,* April, 1919, iii, No. 2, pp. 86-108.

The author considers that the metabolism of the tubercle bacillus is not sufficiently understood. The theory that glycerol, for instance, forms a good medium because glycerol is a component of the fat necessary to the bacillus, seems to him indicative of the popular misunderstanding. Little attention has been paid to the relation of the unquestioned utilization of amino-acids and ammonium salts—which has been experimentally proven—to the normal protein metabolism of the bacillus, with which it must be intimately bound.

In order to test the metabolic reactions, the author fed the organism a few of the various articles of its normal diet, one at a time, and modified in several ways.

The Walpole method, modified by Dernby and Avery, was used to test the reaction of the organism to glycerol peptone. A medium consisting of 1 per cent peptone, 3 per cent glycerol, 0.5 per cent sodium chlorid, and M/75 neutral mixture of di-sodium-hydrogen phosphate and potassium-di-hydrogen phosphate was used to determine the optimum initial reaction for growth.

There was no discernible difference in growth between the limits of hydrogen-ion concentration pH 6.4 and pH 7.8. pH 6.8 was used for the experiments of this investigation.

The utilization by the bacillus of the amino-acids formed from a peptone digest was also tested. Two casein digests were prepared, one by pepsin, the peptone of which was precipitated by alcohol as a snow-white, water-soluble product, the other a tryptic product from a peptonized casein suspension, which, after prolonged trypsin digestion, became biuret-free. The solids from this were obtained by evaporation and drying in the oven at 105°. Another biuret-free product was obtained by the acid diges-

tion of casein with sulphuric acid and by removal of the acid quantitatively with barium carbonate before evaporation and drying. Media were made with these products. The bacilli from nine bottles of both of each type were filtered off after four weeks' growth. By far the best growth took place on the pepsin digest of casein, although characteristic proliferation occurred also on the biuret-free amino-acid media. Nitrogen analyses of inoculated peptone media showed a withdrawal from the media of both peptone and amino-acid nitrogen, with a production of ammonia.

"Good growth occurred on glycerol-sodium chlorid-phosphate media containing M/10 concentration of urethane (ethyl ester of aminoformic acid), glycocoll (amino-acetic acid), and alanin (aminopropionic acid). The acid amids were also readily utilizable. The corresponding ammonium salts of fatty, ketone and hydroxy acids did not permit growth. The amins of the three acids mentioned, that is, ammonia, methylamin, and ethylamin, afforded good growth when used in the form of their hydrochlorids. Methyl and ethyl alcohols were added to ammonium chlorid media with advantage. The ammonium salts of the dibasic acids, oxalic, malonic, succinic, malic and tartaric acids, yielded excellent growth."

As the metabolism of the dibasic acids seems to be different from that of the monobasic acids, experiments were carried out to test its course in a medium the nitrogen of which was present in a dibasic amino-acid. Asparagin, aminosuccinic acid, was chosen. The amid group was chiefly attacked, *an almost complete* liberation as ammonia taking place. In the monobasic series the amino group is more readily used than the amid.

The author thus summarizes his conclusions: "The experiments . . . indicate that the tubercle bacillus hydrolyzes proteoses and peptones, with the formation of amino-acids, and deaminizes the latter. The course of deamination is obscure, but the failure of utilization, in the presence of glycerol, of the ammonium salts of the fatty, ketone and hydroxy acids which might result, suggests that none of these is the normal product of the process. On the other hand, the ready utilization of amins, alcohols, and of ammonium salts of dibasic acids, suggests a more likely route, in which the monobasic acids, which in some may seem inhibitory, are not formed. The theory is advanced that the amino-acids . . . (glycocoll and alanin) break up into ammonia and alcohols, perhaps with amins as intermediate stages, that hydroxy malonic acid (tartonic acid) is formed in the medium through oxidation of glycerol, and that ammonium malonate and malonic ester, or closely allied compounds, are of great importance in the synthesis of the bacillus' organic substance."

Howard, Tasker: Meningo-encephalitis as the Only Manifestation of Mumps. Report of Three Cases. *American Journal of Medical Sciences,* clviii, No. 5, p. 685.

At Camp Lee, during an epidemic, there were 3 cases of mumps, presenting cerebral complications, with absence of salivary gland involvement. Metastatic lesions are well known during mumps, and may appear without involvement of the salivary gland, as in these cases. The diagnosis was made for the following reasons:

(1) The lesions occurred during an epidemic of mumps.

(2) Two patients had never had mumps, while the third had been informed by his father that he had the disease, although it was not within his recollection.

(3) All had mild symptoms of meningo-encephalitis, relieved, or much ameliorated, by spinal puncture.

(4) A Gram-positive diplococcus, supposed to be the causative organism, was recovered from 2 cases.

(5) The spinal fluid, in each case, presented a moderate pleocytosis, characterized by a predominance of mononuclear cells. The conditions with which we are familiar, which give this picture, are syphilis, sometimes tuberculous meningitis, encephalitis lethargica, and mumps.

Tests for syphilis in the case of two of the patients were negative; the third gave a positive Wassermann reaction, and repeatedly showed a gram-positive coccus in the spinal fluid. Tuberculous meningitis lethargica was ruled out, there being no cranial nerve involvement and no palsies. There was also an absence of the increased tendon jerks which have been observed. By exclusion, these 3 cases must be considered meningoencephalitis caused by mumps.

HADEN, R. L.: The Bacteriology of Mumps. Reports of Findings at Camp Lee. *American Journal of Medical Sciences,* Nov., 1919, clviii, No. 5, p. 698.

Twenty-five blood cultures were made in dextrose and plain infusion bouillon from 18 cases. Two resulted in contamination. Nineteen were sterile. Four cultures were made from 3 different patients and showed a small Gram-positive diplococcus. The growth was very slow. The organism appeared in forty-eight hours, when transferred to blood-agar plates. In another case the blood culture was reported negative, but the same diplococcus was found in an inguinal gland which had become swollen. The spinal fluid of another case demonstrated the diplococcus in direct smears.

VALLÉE, A.: Multiple Infarcts of the Spleen in Malignant Endocarditis, Rupture of the Spleen, and Peritonitis. *Canadian Medical Association Journal,* December, 1919, ix, No. 12, p. 1,064.

Professor Vallee reports the case of a man of forty-five, addicted to alcohol, who was admitted to the Hotel Dieu Hospital, Quebec, in July, 1917, suffering from cardiorenal disease. On examination, there was found to be evidence of mitral and aortic insufficiency, albuminuria, numerous hyaline casts, red blood-cells, abundant leukocytes and renal cells, with edema and ascites. Early in September, in addition to the above symptoms and without their aggravation, the quantity of white cells in the blood became so abundant as to be recognized as pus. At this time an irregular rise in temperature with remissions also developed, suggesting a possible suppurative lesion in the kidney. Four or five days before death the patient began to complain of excruciating pain, at first in the right hypochondrium and later in the left. This pain disappeared later but increased again on the evening before death, when it was localized definitely in the left upper portion of the abdomen. There was no distension of the bowels.

The autopsy showed adhesions of the entire pleura with slight congestion of both lungs. The pericardium contained a few grams of yellow fluid with milky patches on the visceral layer. The heart weighed 450 grams. By the water test a wide insufficiency of the aortic valve was readily demonstrated. This valve had a few simple vegetations on its upper surface and many ulcerative ones facing the ventricle. The vegetations were dark in color and pushed the sigmoid cavities to the aortic wall. The slightly thickened edges of the commissures were dull and white. The mitral valve was slightly sclerosed along its margin, with trabeculæ scattered all over it, and two small vegetations were seen on the auricular surface near its margin. These vegetations were 3-4 mm. in diameter, resembling brownish colored mulberries, and they were scarcely adherent. The remaining valves showed nothing except sclerosis. The parietal endocardium was slightly thickened, and sclerosed in the metro-aortic region. Myocarditis with slight hypertrophy of the left ventricle was evident.

Atheromatous patches were scattered over the entire aorta; they were not calcified and were very numerous and large in its abdominal portion.

The omentum, mesentery and intestines showed recently formed pseudomembranes. The parietal and visceral portions of the peritoneum were hemorrhagic, and the abdomen contained a few liters of dark brownish fluid. The appendix, stomach, intestines and pancreas were normal. The liver weighed 1,750

grams and was hyperemic. The spleen was large, soft,, almost fluctuating and friable. Its weight was 415 grams. Its capsule was slightly thickened, covered with exudate, which was deep yellow in color at the upper pole, and purple-gray at the lower pole. It presented many slashed irregular ruptures, not unlike some large cavities in a tuberculous lung. On section, a typical immense yellowish-pinkish infarct was found, with its base to the outer side of the organ and the apex of the hilum. All blood-vessels in the centre of the infarct were thrombotic. The pale infarct could readily be distinguished from the dark red splenic tissue in which the circulation had not been disturbed. The ruptures, which were covered with pus, had carved up the organ in different ways. Thick black fluid characteristic of suppurative lesions of the spleen filled numerous cavities in the interior of the viscus. Its general appearance was not unlike that of gangrene of the spleen following diffuse abcess. The left kidney weighed 210 grams, and was congested; its capsule was thick and easily removable; there were cicatrices of old infarcts; the pyramids showed petechial hemorrhages; the cortex was thin, with evidences of hyaline degeneration. The right kidney was similarly affected. Microscopical examination of all the organs verified the gross lesions. Bacteriological examination of the spleen showed many isolated and few small clumps of Gram-positive cocci—they appeared to be staphylococci. No cultures had been made.

From the history and anatomic examination Vallee concludes that the patient was suffering from a malignant subacute endocarditis, with subacute nephritis and pyemic infarcts of the spleen, and that the latter were the cause of the rupture of this organ, and of peritonitis, the infection being probably due to staphylococci. He remarks that, as a general rule, infarcts are quite common and are not always fatal, especially when they are not of an infective nature. They may disappear, leaving only sclerosis and a scar, such as the kidneys in this case showed. Abscess of the spleen, on the contrary, is not frequent. Osler, however, the author states, points out that the most frequent of these abscesses is one which follows a septic embolus and which can only be diagnosed at the autopsy. Rupture of the spleen does not always follow abscess due to infarct, Osler being the only author, according to Vallee, who mentions the fact.

(It is to be regretted that the blood was not studied culturally during the patient's life-time.—Abstr.).

Herrick, J. B.: Report of a Case of Rupture of an Aortic Aneurysm Into the Left Innominate Vein. *American Journal of Medical Sciences.* Dec., 1919, clviii, No. 6, p. 782.

The author reports the forty-third recorded case of aortic aneurysm rupturing into the superior vena cava, immediately joining the left innominate vein. The patient was a physician thirty-three years old. He had suffered for six months with increasing chest pain radiating into the right arm. After climbing stairs there was a sudden feeling of giving away in his chest, characteristic cough, orthopnea, edema of the face, neck, and body extending to a line of demarcation above the umbilical level. The color was purple, almost black. The heart was difficult to percuss. The base dullness was widened, and over it was a systolic murmur lasting into diastolic, transmitted to the intercapsular region. Over the aortic cartilege a distinct, continuous, soft, blowing, humming murmur was heard. In the lungs were dry and moist râles, with a suggestion of pleural fluid at the bases. The Wassermann was strongly positive. X-ray showed an aneurysm of the first or transverse portion of the aorta. Death followed about a month and a half later with no decrease in symptoms. The autopsy revealed a rounded aneurysmal sac, 7 cm. in diameter, situated 4 cm. above the aortic valves, ruptured into the left innominate vein, less than 1 cm. from the cava. Pathologically it was an old, active, typical luetic aortitis.

Nolf, P.: Staphylococcic Bacteriuria. *New York Medical Journal,* Dec. 20, 1919, No. 25, p. 1,009.

During trench warfare staphylococcic blood infections were frequently met with among the soldiers; these were usually due to badly treated furunculosis, scabies, or pediculosis. In addition to the patients with true staphylococcic septicemia with a great many organisms in the blood, there were many more who did not show evidences of an active infectious condition. Ordinarily the patients belonging to the first group suffered from fever, headache, pains in the limbs, and sleeplessness. During the first few days there was no visceral localization to be noted, except that in over half the cases there was a notable increase in the size of the spleen. The tongue was coated, the appetite poor, and constipation was noted. The urine was diminished in amount, clear in appearance, contained urates, and a small amount of albumin, and occasionally gave a positive diazo-reaction.

In order to make a positive bacteriological diagnosis the urine of all patients who gave evidences of a urethritis was cultured on an extensive surface in a preparation of 1 c.c. of bouillon to 1-10 c.c. of nutritive gelose. It was found that in healthy persons or individuals suffering from other than staphylococcic infections, staphylococci rarely occurred in the urine, that successive cultures did not reveal the staphylococci with regularity, and that when present, they were only found in the bouillon cultures. From this, the author concluded that the presence of staphylococci is sufficient only when the organisms grow on bouillon and gelose, when the colonies on the gelose multiply, and are of the same general type, and when they can be obtained several times in urine collected from the same patient. This occurs regularly in patients who have either a true staphylococcic septicemia or an attenuated form of sepsis without organisms in the blood. The organisms may be present in the urine during the first few days of the disease. In some cases of true septicemia the organisms may be found in the blood and *not in the urine* at the beginning of the disease; later they may be recovered from the urine. Usually when a few germs are eliminated in the urine they are eliminated for a very short period only and the urine becomes sterile a few days or weeks after the fever has subsided. The opposite of this, however, may occur. In some cases it took several months before the organisms had entirely disappeared from the urine.

Except for the presence of organisms, the urine is absolutely normal, and the patients show no clinical evidence of disease. The organisms may be present in very large numbers; 1-10 c.c. of urine cultured upon an extensive nutritive surface of gelose will show innumerable colonies of bacteria. This condition has been known for a long time clinically under the name of bacteriuria, and the majority of these bacteriurias are due to the colon bacillus.

In the author's case of staphylococcic bacteriuria all the steps of microbic infection were reestablished: (1) cutaneous infection; (2) blood infection; (3) urinary infection. The long duration of the elimination of the bacteria resembles in character the elimination of the *Bacillus typhosus* in the bile or in the urine of patients recovering from typhoid fever, who become typhoid fever carriers. This similarity to typhoid fever carriers is also seen in the resistance of patients with staphylococcic bacteriuria to the usual therapeutic procedures.

According to Nolf it is useless to sterilize the urine in these two types of patients by irrigations of the bladder, or by the internal administration of the urinary antiseptics. He looks upon these carriers as incompletely cured patients, in need of increased immunity, and as such submits them to a course of vaccine therapy consisting of intensive, properly prepared doses, injected *intravenously.* He found that the organisms disappeared in every case, usually after prolonged treatment. He applies the same method of progressive intravenous vaccine injections for bacteriuria caused by the colon bacillus. In

one case an intensive course of subcutaneous vaccination was given, during which time several doses of ten billion organisms were injected without any effect whatever; when the organisms were injected intravenously a definite sterilization was produced by a dose of fifty million organisms. The therapeutic results in these cases, according to Nolf, show that the conception that bacteriuria is an infection of the urine, rather than of the urinary apparatus, is erroneous.

Giffin, H. Z.: Persistent Eosinophilia, with Hyperleukocytosis and Splenomegaly. *American Journal of Medical Sciences,* Nov., 1919, clviii, No. 5, p. 618.

The case is given of a male thirty-one years old, with generalized anasarca and moderate anemia. There was a past history of fever simulating typhoid, followed by pneumonia eight years ago; the patient had never been well since. Gradually, over a period of eighteen months, he became dyspneic, coughed, occasionally vomited. Later, he developed pain in the left thoracic region, and edema of legs and face. All symptoms became rapidly worse five weeks before he presented himself for examination. At this time he could not work on account of breathlessness, wheezing, and cough. On examination he showed marked edema of the legs, scrotum, and body up to the level of the arm-pits. The auxillary glands were easily palpated. Marked splenomegaly was observed, extending to the navel. A Wassermann test was negative. There was no indication of nephritis. The stools were negative. Microscopic examination of lymph-glands and skeletal muscles was negative. Leukocytosis was 21,800, with an eosinophilia of 73.6 per cent. The total lymphocytes formed 19.3 per cent, while the polymorphonuclear count was only 13 per cent. The red cell count was 3,620,000, with 69 per cent hemoglobin. At first the patient was given absolute rest and milk diet for two months. In ten days the edema subsided. He did light work for about fourteen months, and returned for examination in fairly good condition. Owing to the marked splenomegaly and persistent blood picture his spleen was removed. It measured 10 by 12 inches and weighed 2,110 grams. The microscopic picture was of myelogenous leukemia. The left lobe of the liver was enlarged. Within one month after splenectomy the leukocytes increased to 97,200, with 79 per cent eosinophils. The patient was in good general condition. Three and a half years later his leukocytes numbered 135,000, 87 per cent eosinophils. He continued in good health for another year, when gradually weakness, cough and dyspnea returned. Death was due to empyema following pneumonia. At autopsy normous numbers of eosinophilic polymorphonuclears were found in all hemopoietic organs. Eosiniphilic myelocytes were numerous in the bone-marrow and lymph-glands. The author regards this case as an instance of eosinophilic hyperleukocytosis, the blood picture of which was remarkably altered by removal of the spleen. The permanent increase of leukocytes following splenectomy indicates a special function of the spleen with respect to the toxins which eosinophilic cells are capable of absorbing.

Westphal, A.: Ueber das Vorkommen von Stabchenzellen bei der multiplen Sklerose. *Neurologisches Centralblatt,* Jan. 2, 1918, xxxvii, No. 1, p. 2.

The author, in the extensive literature with which he is acquainted, has met with no mention of the occurrence of numerous rod-cells in multiple sclerosis. He therefore describes briefly from his experience a case with such postmortem findings. The case was remarkable for the presence of a large number of sclerotic foci of all sizes, ranging from those only microscopically visible to those involving whole sections of the convolution. These foci were situated in the central nervous system—in the cerebrum, cerebellum, pons, and medulla oblongata—being particularly numerous in the centrum semiovale, the temporal lobe, the large ganglia, and the regions situated near the ven-

tricle. In the white substance of the spinal cord they were easily distinguishable because of their contrasting color and hard consistency. The rod-cells to which the author calls attention were found in the sclerotic foci in the medulla, more especially in the vicinity of the ventricle. These cell growths, which were first described by Nissl, correspond to those found by Alzheimer in progressive paralysis. Kraepelin also describes rod-cells in the postmortem findings of progressive paralysis, and states that they were found in narcolepsy by Spielmeyer, and that they have been found in other diseases of the cortex, although only in small numbers. Spielmeyer has called attention not only to the anatomical resemblance between progressive paralysis and multiple sclerosis, but also to the similarity of the histological findings. The author adds his findings of numerous rod-cells in multiple sclerosis as further confirmation of the histological similarity of the two diseases. The possibility is mentioned of proving by further research that the spirochetes discovered by Kuhn and Steiner in multiple sclerosis stand in etiological relation to the disease. If such proof should be forthcoming the histological findings of plasma and rod-cells in both multiple sclerosis and paralysis would acquire added interest, because a question would then be in order as to whether the histological changes might not throw some light on the nature of the exciting cause of the disease.

MAAS, OTTO: Klinisch-anatomischer Beitrag zur Kenntnis systematischer Linsenoerndegeneration. *Neurologisches Centralblatt,* Jan. 2, 1917, xxxvii, No. 1, p. 16.

As a result of exhaustive clinical and anatomical study Wilson has given us the picture of "progressive degeneration of the lenticular nucleus." Somewhat similar cases were described before Wilson's time and others have been published since under the name of pseudosclerosis, the name chosen by C. Westphal because of the fact that the clinical picture suggested the diagnosis of multiple sclerosis while section of the central nervous system revealed none of the essential features of this disease. The author presents a case with extreme trembling as the most pronounced clinical symptom, which he at first took to be pseudosclerosis or diffuse sclerosis, all other clinical symptoms being against the assumption of multiple sclerosis. The histological examination, however, revealed bilateral degeneration of the lenticular nucleus corresponding to Wilson's findings. Nothing pathological was discovered in the thalamus and nucleus caudatus. Clinically, however, the author's case differs in some points from the cases described by Wilson, but the clinical pictures of both lenticular degeneration and pseudosclerosis, as presented by Sawyer, Stocker, Cassier, C. Westphal and others, are not constant, although all agree that the main symptoms of both diseases are extreme-trembling and muscle rigidity. Reviewing all the observations published, the author is of the opinion that clinically lenticular degeneration cannot be distinguished from pseudosclerosis. As for the anatomical findings—usually described as pseudosclerosis—nothing essentially significant was found in the brain, but many of the cases were of earlier periods, and no thorough examinations for glia-cells were made. Alzheimer's finding in pseudosclerosis is important, namely of moderate sized glia-cells scattered throughout the brain, giant glia-cells with large plasma areas, principally in the basal ganglia and nucleus dentatus of the cerebellum, glia-cells in smaller numbers in the cerebrum, and isolated glia-cells in other parts of the brain. A Westphal, in his case of pseudosclerosis, found glia-cells of moderate size, and places particular emphasis on the absence of giant glia-cells. The strong glia proliferation without vessel changes is common to both cases, corresponding with both the author's findings and Wilson's. In these latter findings the histological changes were situated principally in the lenticular nucleus, while Alzheimer and A. Westphal found glia proliferation in other sections of the nervous system, as did also Stocker, who,

nevertheless considered his case to be one of lenticular degeneration of the nucleus, and emphasized the similarity of his findings to those of Alzheimer in his case of pseudosclerosis. The circumstance that in cases of lenticular degeneration other physical symptoms, such as affections of the spleen and other glands, are seldom absent, also goes to show that the disease processes are not limited exclusively to the lenticular region. In the author's opinion we are justified in considering degeneration of the lenticular nucleus and pseudosclerosis as identical. Degeneration of the lenticular nucleus is also related to another disease, *i. e.*, dystonia musculorum progressiva. No thorough histological examination of this disease, so far as the author knows, has been made, and it is therefore impossible at present to establish its identity with degeneration of the lenticular nucleus.

Reichardt, M.: Zur Frage der pathologisch-anatomischen Grundlage der reflectorischen Pupillenstarre. *Neurologisches Centralblatt,* Jan. 2, 1918, xxxvii, No. 1, p. 7.

Uthoff has presented a case where there was typical unilateral pupillary rigidity with preserved convergence motions, in an individual with a bullet wound on one side of the seventh cervical vertebra, syphilis being excluded. He was unable to account for the persistent rigidity of the pupil because he regarded the only explanation for typical loss of pupillary reflexes with preserved convergence to be an interruption of the fibers controlling the light reflexes after they branch off from the optic tract up to the nucleus of the oculo-motorius (rectus internus muscle). For those, however, who are of the opinion that certain localized lesions of the spinal cord may produce reflex pupillary disturbances there is nothing surprising in Uthoff's case. It is only necessary to assume that, proceeding from the lesion in the lower cervical or upper dorsal portion of the spinal cord, a tubular extravasation has extended along the posterior column or to the region of the central canal, or has occurred at this location as a result of a commotio spinalis which has healed through cicatrization. Uthoff's case opens anew the question of the pathologico-anatomical ground for loss of pupillary reflexes, and shows the necessity, in traumatic injuries, especially of the cervical regions, for examination of the pupils, systematically and continuously, until recovery, that is to say, until the establishment of a stable neurological condition, or, in fatal cases, until death. Notwithstanding the general neglect of pupillary examinations in lesions of the cervical cord, there is some evidence at hand of pupillary disturbances due to traumatic lesions. The evidence is much strengthened when the non-traumatic, more or less diffuse, diseases affecting these regions are taken into consideration. In 1903 the author gave a list of such cases from the older literature, which furnished irrefutable evidence of a close relation between the cerebral cord and the pupil-innervation. He now adds cases from the recent literature published by Syllaba, Siemerling, Fisher, and others. He concedes that the experiments made by Trendelenburgh and Bumke on cats would have to be taken as strong evidence against the cerebral cord and oblongata theory for loss of pupillary reflexes if it were proved that the conditions of innervation of the pupils in animals were not possibly, indeed probably, different from those in man. The author comes to the conclusion that, until the contrary is proved, we must always reckon with the possibility that lesions in various parts of the central nervous system many lead to disturbances of pupillary reactions produced in a manner resembling that in which spastic phenomena occur that are due to changes variously localized in the central system. Besides there is an isolated rigidity of the pupil to light, also probably of reflex character, where the posterior columns of the spinal cord are normal (cerebral, pupillary rigidity in contrast to spinal), just as there are, for example, extreme spastic conditions in affections of the pyramidal tract which are

not anatomically recognizable. If the numerous cases of diffuse injuries of the superior cervical segments of the cord with accompanying pupillary rigidity, cited by the author in support of his theory, are not all to be taken as errors in observation or as due to possible luetic complications, then, in spite of Bumke's objections, the medulla theory is so far supported that further tests are desirable and necessary. Only facts can decide this important scientific question, and the author requests his colleagues to cooperate with him in its solution by making exact and consequent observations of pupillary conditions in all injuries of the superior cervical region.

CALMETTE, A.: Sur l'Excretion des Bacilles Tuberculeux par l'Intestin et par les Voies Biliares. *Annales de l'Institut Pasteur,* Feb., 1919, xxxiii, No. 2, pp. 60-7.

Several authors have shown that various bacilli, circulated in the blood, may be excreted through the intestines. Calmette demonstrated by animal experiments that the *Bacillus tuberculosis* may also be thrown off through the bile-passages. Into the vein of the ear of a series of rabbits he injected 1 c.c. of bovine bacilli in fine emulsion, obtained from a six week's culture on glycerinated potato. The animals were killed by section of the jugular vein, twenty-four hours, forty-eight hours, and three, four, five, six and seven days, respectively, after inoculation. Directly after death the contents of the biliary vesicle were aspirated into a pipet and centrifuged. The residue, diluted with water, was inoculated subcutaneously in doses of 0.5 c.c., into the thigh of 4 guinea pigs. Those which had been inoculated with the bile of rabbits injected twenty-four or twenty-eight hours, or five or six days before, remained uninfected, whereas those which had received the bile of rabbits killed on the third, fourth, and seventh days, showed signs of tuberculosis. Experiments with animals which had received emulsions of human bacilli, were less conclusive.

Other authors have demonstrated the elimination of bacilli in the bile of animals (cattle and pigs) naturally infected. In most cases the animals used had generalized tuberculosis, with hepatic lesions.

Calmette examined the feces of 74 subjects with various forms of "closed" tuberculous lesions, pleurisy, granulation, caseous ganglions, involvement of the bones and joints, etc., and found tubercle bacilli in 52 cases. The bacilli appeared intermittently, usually following a dose of calomel or other cholagogue.

Other experimenters have corroborated these findings, among them E. C. Schroeder and W. E. Cotton of the Bureau of Animal Industry in Washington, who report that: "100 cows, which reacted to tuberculin but did not present any other clinically discoverable lesion, excreted, intermittently, virulent bacilli in their feces."

The author considers that the bacilli may reach the bile through the blood circulation and the liver, and thence be excreted in the feces, or that they may reach the intestine in swallowed sputum. At any rate, the need for care is manifest when one considers the numerous possibilities for infection. Bovine tuberculosis may be spread through the cow's milk, through the soil fertilized by excrements, through contamination of the hands and garments of dairy attendants, etc. The author therefore urges the importance of guarding against such modes of conveyance.

HEIST, G. D., AND SOLIS-COHEN, S.: The Bactericidal Action of the Whole Blood of Rabbits Following Inoculations of Pneumococcus Bacterins. *Journal of Immunology,* July, 1919, ix, No. 4, p. 147.

The essential feature of the method is that a capillary glass tube is filled by capillary attraction up to a fixed mark with broth culture of pneumococci, and then emptied. A certain number of pneumococci remain sticking to the wall of the tube. Blood, as it comes from capillary or vein, is allowed to

flow up the tube to the mark and the tube is then sealed and incubated. If the blood has no bactericidal action, the pneumococci which have remained on the wall of the tube find themselves in a favorable medium and multiply rapidly; if it is bactericidal they are killed and no growth results. Readings are made by blowing out the contents of the tube on a glass slide, staining, and examining them under a microscope. By combining several capillary tubes into one many-stemmed pipet, modelled after the one Wright uses for estimating the coagulation time of the blood, and by using a series of ascending dilutions of both culture, an approximate quantitative value may be given to the test.

Using this method has shown that the blood of pigeons, a species immune to pneumococcal infection, destroys virulent pneumococci *in vitro,* whereas the normal blood of rabbits, a species highly susceptible to the organism, has no such action. If, however, rabbits, whose blood was previously tested, and proved a favorable culture medium for the germs, were suitably immunized with dead bacteria, their blood would show an acquired bactericidal power. No bactericidal action on pneumococci was, however, found in this defibrinated blood, or in the serum of pigeon, normal rabbit, or inoculated rabbit. The most general conclusion, and the most important one, to be drawn from the work upon bactericidal activity of whole blood *in vitro,* is that whole blood, before it coagulates, possesses bactericidal properties which can be investigated and measured with considerable accuracy—properties which do not become apparent when blood serum alone is examined. Increasing the virulence of pneumococci for rabbits increases their ability to grow in rabbit blood *in vitro.* The mathematical expression of the ability of a strain of pneumococci to grow in the blood of normal rabbits *in vitro* is an expression of the virulence of the strain for rabbits.

The production, by suitable inoculations of specific bactericidal activity into the blood of rabbits, for pneumococci of one type, is accompanied by the production of slight bactericidal activity for other types.

A bacterin prepared from pneumococci washed from the peritoneal cavity of a rabbit which has died of pneumococcal infection is more powerful as an immunizing agent for rabbits than one prepared from pneumococci grown upon artificial culture media.

Roos, C.: Notes on the Bacteriology, and on the Selective Action of *Bacillus Influenzæ* (Pfeiffer). *Journal of Immunology,* July, 1919, iv, No. 4, p. 189.

Bacillus influenzæ may be found in every case of true clinical influenza. To isolate this organism, which is most abundant in the earlier stages of the disease, it is necessary to exercise care in obtaining a suitable specimen, and since the growth requirements of this organism are quite rigid, special selective culture media, such as those selected by Avery, and also by Fleming, carefully prepared and adjusted to reaction, are essential for successful work.

The various strains of *Bacillus influenzæ* apparently do not differ in kind. This is indicated by the cross agglutinations, absorption and protection tests with strains isolated at different localities during the recent pandemic, as well as with those from the epidemic of a few years ago—1915 to 1917.

The toxic substances of *Bacillus influenzæ* show a marked action on the broncho-respiratory tract, thereby predisposing these organs to extensive invasion by the organism itself, or to secondary infection.

No marked increase in virulence of *Bacillus influenzæ* has been obtained by passage through laboratory animals. This may be due in the first place to the relative insusceptibility of these animals to the infection of this organism, secondly to the probability that the invasive power of the organism is very limited, infection apparently taking place only when the initial toxicity is severe enough to facilitate such invasion.

No bacteriemia is produced by *Bacillus influenzæ* in laboratory animals by a dose approximating a minimum lethal dose, regardless of the mode of injection chosen. Rabbits

receiving intracranial injections may die of acute toxemia and show no organism in the blood stream or lungs, or, when such infection passes into the subacute stage, there is apparently a chance for a few of the organisms to pass into the blood stream and to be transferred to such organs as the lungs, when these have been rendered susceptible to the toxic substance of the organism.

The pathological lesions in the rabbit, gross and microscopic, resemble, in many respects, those of the *Bacillus influenzæ* in human beings, as observed during the past pandemic.

The injection of *Bacillus influenzæ* into the rabbit intravenously results in a rapid and marked decrease in the polymorphonuclear cells.

Sellards, A. W., and Sturm, E.: The Occurrence of the Pfeiffer Bacillus in Measles. *Bulletin of the Johns Hopkins Hospital,* Nov., 1919, xxx, No. 345, p. 331.

The examination of a group of measles cases occuring at Camp Devon a few weeks after an epidemic of influenza showed the presence of an organism indistinguishable from the Pfeiffer bacillus in 25 out of 31 cases. This organizm was readily obtained from the sputum, and also from the conjunctivæ. A highly parisitic hemoglobin-requiring organism was obtained in 1 of 2 cases from an excised inguinal gland. The Pfeiffer organism was not obtained from the blood stream nor from the excised skin lesions. With the subsidence of the active symptoms of measles these microorganisms disappeared rather rapidly in about three-fourths of the cases. Cultures of the Pfeiffer organisms from cases of measles failed to colonize when innoculated on the mucus membrane of 4 healthy volunteers. Two of these individuals had not, to their knowledge, had measles or influenza. A comparison was made of the strains of the Pfeiffer bacillus isolated from measles and from influenza. The results showed considerable variation in the behavior of the individual strains. It is theoretically possible that the hemoglobin-requiring bacilli represent a group of organisms containing different species. The occurrence of the Pfeiffer bacillus in both measles and influenza constitutes suggestive evidence against its etiological relationship to either disease. This evidence would be materially strengthened provided the identity of the strains from these two sources were accurately established. The evidence which is available at present is not sufficiently complete to exclude the specific role of the Pfeiffer bacillus in some of the acute respiratory diseases.

Holm, M. L., and Davison, W. C.: Meningococcus Pneumonia. 1. The Occurrence of Postinfluenzal Pneumonia in Which the Diplococcus Intracellularis Meningitidis was Isolated. From Observations at Camp Coetquidon, A. E. F., France. *Bulletin of the Johns Hopkins Hospital,* Nov., 1919, xxx, No. 345, p. 324.

At Camp Coetquidon, during the influenza epidemic, 85 patients suffering from postinfluenzal pneumonia were found to have meningococci in the sputum; 23 pneumonia patients coming to autopsy showed meningococci in the lungs. In severe cases the onset was usually acute, after a period of indisposition lasting a few days or a week. During the prodromal period there was usually a history of chills, fever, headache, cough, pain in the chest and general malaise. The patient's appearance showed a high degree of poisoning; the chest examination showed variable areas of dullness and numerous moist râles, quite generally distributed. The temperature was 103-106° F. (39.44-41.11° C.), pulse from 85 to 100, respirations 25 to 30. A blood culture was sterile, and the leukocytes were normal or reduced in number. The sputum was at first thin and watery, but rapidly changed to a creamy white, which, on microscopical examination, showed numerous pus-cells and Gram-negative diplococci. Severe cases grew rapidly worse; the cyanosis increased; the lung con-

solidatation extended and the patient died within a few days. Among those who survived, there seemed to be a marked tendency toward the development of a suppurative bronchiolitis and protracted recovery.

During the same period, 22 cases of meningococcus meningitis occurred, and four surveys, of from 1,160 to 2,286 men each, showed a percentage of carriers varying from 5 to 16 per cent. The strain of meningococcus proved to be Type B Pasteur in all of the meningitis cases which were classified, and in the majority of the pneumonia cases. It was usually found in combination with other organisms in pneumonic lungs, but was recovered in pure culture in 7 cases. Both broncho- and lobar pneumonia were encountered, but the former was the more frequent.

The authors conclude that cases of meningococcus pneumonia may arise from contact with cases of meningococcus meningitis and *vice versa*.

Howard, C. P., and Royce, C. E.: Progressive Lenticular Degeneration Associated with Cirrhosis of the Liver (Wilson's Disease). *Archives of Internal Medicine,* Nov. 15, 1919, xxiv, No. 5, p. 497.

A case occurring in a previously healthy man of 22 is reported in great detail. Mentally the subject was distinctly emotional, but otherwise normal. He exhibited peculiar choreiform movements of the extremities, muscular rigidity and hypertonicity, and painful spasmodic contractions. There was a tendency to grasp spasmodically various objects, such as the bed-clothes, the back of a chair, or the hands of the examiner, resulting in a painful spasm until he was disengaged by the nurse or attendant. The examination of the reflexes, both superficial and deep, and of the various forms of sensation, as well as of the special senses, was entirely negative, as is usual in this disease. No signs of hepatic insufficiency were manifest. The patient died of an acute infection, and autopsy showed progressive degeneration of the neuron and glial elements of the basal ganglia, most extensive in the lenticular nucleus but involving the optic thalamus, caudate nucleus, internal capsule, and red nucleus, and to a slight extent the white matter just below the grey matter of the cortex. There were also a chronic interstitial hepatitis lymphoid hyperplasia manifest in spleen and retroperitoneal lymph-nodes, acute congestion of spleen and kidneys, and colloid cystic degeneration of the parathyroid glands.

Bloomfield, A. L.: The Fate of Bacteria Introduced Into the Upper Air Passages. *Bulletin of the Johns Hopkins Hospital,* Nov., 1919, xxx, No. 345, p. 317.

The author carried out a number of bacteriological studies designed to determine the fate of bacteria introduced into the nose and mouth of human beings. For this purpose he chose a *Sarcina lutea,* as being non-pathogenic, not normally present in the upper air passages of man, easily recognized, and not easily overgrown by the normal mouth flora. It was found that even a short period of time after these organisms had been swabbed in large amounts on the tongue and nasal mucosa, and into the crypts of the tonsils, it was usually impossible to recover them. Disappearance from the nose was somewhat slower than from the other sites. In only one instance could any organisms be recovered after twenty-four hours, and in no case after two days. Cultures made in this way do not prove the complete absence of the organism, but the general trend of the quantitive relations indicates a rapid disappearance. Possible factors active in causing their disappearance from the mouth were considered. Mechanical cleansing by thorough and extensive irrigation was found to exert very little influence. The action of the normal mouth flora was excluded by growing the sarcinæ very successfully with a suspension of these organisms. Finally it was found that the saliva and mouth secretions exert a prompt and marked bactericidal effect, as far as these organisms are concerned.

FRIEDMAN, E. D.: Brain Tumor. *New York Medical Journal,* Nov. 8, 1919, cx, No. 19, p. 765.

Friedman reports 2 cases of brain tumor in which the clinical diagnosis was verified at autopsy.

Case I. A forty-one year old tailor came under observation on January 22, 1917. His father had died at the age of forty-five from some form of cerebral disease. One brother had died of tuberculosis. His previous history is of no significance. The present illness began nine months ago with occipital headaches; several weeks after the onset of the headache, the patient began to "see double." There was no nausea. Some dizziness was noted, and weakness in the right hand and foot. For the last ten days before examination there was some difficulty in swallowing and in speech. The patient tended to fall to the right side.

Examination showed that both pupils were irregular but reacted to light and accommodation. The fundus showed a choked disc on the left side and distended veins on the right. There was paralysis of the left abducens, with dropping of the right angle of the mouth, and spasm in the left platysma. The tongue was slightly deviated to the right. Right hemiparesis was present, with a diminution of the right abdominal, cremasteric and foot-sole reflexes. No pathological reflexes were noted. Sensation was normal. No other signs or symptoms were present.

Three days later, there was a rapid nystagmus on looking to the right, and percussion tenderness of the right side of the skull. The patient stated that the pain was originally over the left occiput. The fundi showed the outline of the left disc to be indistinct, with swelling of the head of the disc. The right disc showed similar changes. Corneal reflexes were present. Spinal puncture was not performed. The urine was negative. A blood Wassermann on three different occasions was negative. Lungs and heart were negative.

The paralysis of the left abducens and the right hemiparesis (crossed paralysis), the nystagmus, and the choking of both discs, led Friedman to diagnose a tumor of the left half of the pons. The absence of definite sensory changes was anomalous. The patient subsequently went to one of the New York hospitals, where he died in April, 1917. The autopsy showed miliary tuberculosis and a large solitary tubercle in the pons.

Case II. A married man, packer by occupation (age not given), of good previous and personal history, came under the author's observation on Feb. 2, 1917. The present illness began six weeks before. While at work, the patient suddenly felt queer and became dizzy but did not lose consciousness. Fifteen days later, he became aphasic and was unconscious for an hour, but recovered sufficiently well to go home and to return to work the next day. Five days before the first examination he had another spell of dizziness with nausea and vomiting. There was no impairment of vision. No marked headache was present. The right half of the body felt weak.

Examination showed the pupils to be normal; there was some hemiparesis on the right side, and complete loss of sensation with hypesthesia of the cornea on the same side. There was definite astereognosis and loss of tactile perception. The deep reflexes on the right side were exaggerated. The abdominal, cremasteric and sole reflexes diminished on the right side. No pathological reflexes were noted. A blood Wasserman was negative. The spinal fluid showed no increase in cells or globulin, and gave a negative Wassermann reaction. The fundi were normal. Heart and lungs were negative. Blood-pressure was normal. *X*-ray of the skull showed a large sella turcica.

Owing to the abruptness of the onset and the periodical aggravation of the symptoms, the author first suspected a progressive cerebral thrombosis. About April 1, 1917, the patient began to suffer from headaches and vomiting, and became markedly aphasic. Alexia and agraphia set in. Blurring of the outline of the left disc was noticeable. Per-

cussion of the left side of the skull showed tenderness and gave tympanitic resonance. The pulse-rate dropped to 50 per minute. On account of these evidences of increased intracranial pressure the original diagnosis was changed to that of cerebral neoplasm, probably subcortical in the parietal lobe.

The patient was then transferred to the hospital, where the diagnosis of frontal lobe tumor was established and an exploration of this region performed. No tumor was found. A few days later the patient developed a meningitis and died. The pathologist reported "a primary subcortical neoplasm in the left parietal region. Microscopical examination showed that it was a perithelioma. The hypophysis was found to be enlarged to twice its normal size, due to diffuse adenomatous hypertrophy.

Friedman based his localization on the persistent astereognosis, the sensory changes, the absence of cortical convulsions, the transitory character of the aphasia, and the mild motor disturbances. The association of alexia, agraphia and aphasia, he thought, indicated a lesion of the subcortical association tracts.

Wollstein, M.: Pfeiffer's Bacillus and Influenza. A Serological Study. *The Journal of Experimental Medicine,* Dec. 1, 1919, xxx, No. 6, p. 555.

Serological reactions of Pfeiffer's bacillus with a serum of recovered patients, as well as with monovalent immune rabbit sera, showed that the agglutinations were irregular and not satisfactory. The Department of Health, New York City, found the Pfeiffer bacillus in from 80 to 100 per cent of influenza patients. The bacilli isolated from different cases did not produce identical immune bodies in inoculated animals as measured by the agglutinin absorption test. Complement-fixation reactions were almost always positive with antigens made from more than one strain of the bacillus.

It is shown that the sera of patients convalescent from influenza yield reactions for agglutinins, precipitins, and complement-binding bodies with antigens of Pfeiffer's bacillus. These reactions appear constantly at the end of the first week, increase in intensity during the second week, remain demonstrable for from two to four months, and are most complete in the sera of postinfluenza pneumonias. The strains of Pfeiffer's bacillus isolated during the epidemic were morphologically and biologically similar to the strains isolated from influenza cases in other years; antigenically they differed from them only quantitatively. The patients' serelogcial reactions indicate the parasitic nature of the bacillus, but are not sufficiently stable and clean-cut to signify that this bacillus is the specific inciting agent of epidemic influenza. They do, however, indicate that the bacillus is at least a very common secondary invader in influenza, and that its presence influences the course of the pathological process.

McClure, G. W., and McCarty, E. D.: Roentgenographic Studies in Gout. *Archives of Internal Medicine,* Nov. 15, 1919, xxiv, No. 5, p. 563.

In the cases of gout studied the authors found:

(1) Focal areas of decreased density, which may be the only changes. These changes are usually most pronounced in the heads of the metatarsal or metacarpal bones.

(2) Very slight lipping at the margins of the articular surfaces of the bones entering into the first metatarsophalangeal joint.

(3) A variable degree of atrophy of all the bones of the affected member, or of the bones of an involved joint only.

(4) Narrowing of certain joint spaces, with marked proliferative and atrophic changes.

The focal areas of decreased density have been supposed to be pathognomonic of gout, but the authors have found them in from 10 to 12 per cent of non-gouty arthritides.

WADE, W. H., AND MANALANG, C.: Fungous Developmental Growth Forms of *Bacillus Influenzæ*. *The Journal of Experimental Medicine*, Jan. 1, 1920, xxxi, No. 1, p. 95.

Bacteriological findings during the influenza epidemic strongly indicated that the Pfeiffer bacillus played an important part in the disease. Accordingly, attempts were made to determine, if possible, the essential factors influencing its pathogenicity. Yanagisawa reported the effect of simultaneous injection of *Bacillus influenzæ* and streptococci or pneumococci into white mice. Attempts were made to duplicate the experiments by cultivating the organisms together in fluid media. At the same time an attempt was made to determine whether a filterable stage might be produced in bouillon or in the synthetic media of Lohnis and Smith, with and without added blood extract (hemoglobin). The development of morphologic changes which appear in certain of these first cultures were so surprising that more extensive observations were made of this feature. The organisms used were typical strains of the influenza bacillus, obtained from autopsies.

It was found that three different strains of an organism supposed to be *Bacillus influenzæ* would, under certain conditions, abandon the usual bacillary form and grow as a frank fungus, morphologically of the discomyces type. Under other conditions they show fewer modifications, the most striking feature being the production of conidiospores, bodies of a type not found in true bacteria.

STRAUSS, SPENCER G.: Malignant Neoplasms of the Thymus Gland. *New York Medical Journal*, Oct. 18, 1919, cx, No. 16, p. 646.

In reviewing the literature on the subject, the author remarks, one is struck with the fact that this pathological phenomenon is comparatively rare, and that, on account of this lack of material, the theoretical questions involved have been poorly worked out. It is accepted at the present day that the thymus is originally purely of entodermal origin. These outgrowths of epithelium become separated from their point of origin and continue their growth independently, and in the older embryos the gland is found to be composed of this paired epithelium lying between the upper limit of the pericardium and the isthmus of the thyroid. Fusion is almost never complete, and the gland always maintains its bilobar character.

It has been customary to consider the normal thymus as growing up to the second or third year, when it begins to atrophy, until at puberty nothing is left of it. Recently this view has been greatly modified. Bosanquet states that usually no vestige of it is left at the age of twenty, although traces may be found microscopically up to old age. Some claim that the gland enlarges until puberty and then begins to atrophy, but does not entirely disappear until the age of forty. Others state that it begins to atrophy at birth and does not disappear until the fortieth year. Pappenheimer believes that the gland reaches its maximum growth at about fifteenth year, when it begins to undergo involutional changes, at first quickly, later slowly. Some thymic parenchyma may be demonstrated even in the aged.

As to the origin of the apparently lymphoid cells of the mature glands, equally conflicting views are found. The latest researches do not prove the origin of the lymphoid cells, but do show that the epithelium is transformed into the reticular tissue of the thymus in which the lymphoid cells, whatever their origin may be, undergo mitotic division, the Hassal corpuscles representing compressed parts of the reticulum. M. Simmonds immediately raised the point that if the thymus is regarded purely as epithelial, one would have to characterize as carcinomata all growths which were previously named sarcomata and lymphosarcomata, but he himself agrees that a purely genetic classification of neoplasms is unsatisfactory, and that the morphology of the mass must be the deciding factor. The author is inclined to accept this point of view.

From the cases hitherto reported it seems that sarcoma is more frequent than carcinoma in the young, and that carcinoma is more frequent in the old.

In the diagnosis of a thymic growth, Strauss takes into consideration the following factors: (1) the position of the growth, (2) its form, (3) any possible connection with remnants of the thymus gland, and (4) the structural elements of the growth.

The neoplasm is usually located in the place formerly occupied by the thymus, but this is no reason for saying that the growth is absolutely thymic in origin, as in the larger growths where other structures are implicated, it may be impossible to determine its points of origin. All malignant neoplasms being as a rule irregular in outline, the form of the growth cannot be considered a diagnostic criterion. The finding of thymus remnants in the growth is not conclusive, as often the neoplasm begins outside of, but finally includes, the thymic rest. The morphology of the cell elements of the neoplasm is the one factor upon the basis of which a diagnosis may be made. Although the presence of Hassal corpuscles in the mass absolutely determines its thymus origin, their absence does not prove anything, for it must be remembered that they are at best not easily found, and that they occur chiefly at the periphery of the gland and only in fresh specimens; as the gland matures these bodies gradually grow less numerous.

The article is concluded with the recital of a case seen by the author in the Lenox Hill Hospital in New York City. Owing to the rarity of these cases it is advisable to include the history of the case in this abstract of the original article:

Patient, M. B., white, male, sixty years old, was seen by Strauss four months before death. At that time he complained that his face and neck had become swollen, that he had lost weight rapidly for some time past, and that he had some difficulty in swallowing and speaking. A month later he was seen again, when it was found that his heart was lightly displaced downward. Two months later he was admitted to the hospital. A complete physical examination showed: no general skin eruption, icterus or edema; the entire skin loose, dry, and somewhat distended; marked caput medusæ; face and neck somewhat blue; general adenopathy, most marked in the left axilla and in both inguinal and femoral regions; some exophthalmos with a slight Moebius and some lateral nystagmus; tongue slightly coated and dry; tonsils and fauces markedly congested; no tracheal tug; thorax slightly prominent to the right of the sternum in the first and second costal spaces. This area was dull on percussion for 5 cm. to the right of the sternum; the dullness extended down to, and was continuous with, the liver dullness; this area was somewhat tender but not discolored. No thrills or pulsations were felt. The heart-sounds were slightly rapid but normal. There was no change in the radial pulses. Both lungs were slightly emphysematous, with signs of bronchitis posteriorly over the base of the right lung. The liver was palpable just beneath the free costal margin. There were no masses or tender areas in the abdomen. No changes were found in the tendon reflexes. Laryngocopic examination showed the right vocal cord to be immovable and partially abducted; the left cord was only slightly movable. The *x*-ray examination showed the presence of a mediastinal mass over the base of the heart. A severe attack of dyspnea ten days antemortem necessitated the performance of a tracheotomy. The blood showed secondary anemia with a slight leukocytosis. The temperature ranged between 99° F. and 100° F., (37.22° and 37.78° C.); the pulse was 100-110; respirations were between 20 and 30.

WAR MEDICINE AND RECONSTRUCTION

McMurtrie, D. C.: Influence of Pension or Compensation Administration on Rehabilitation of Disabled Soldiers. *American Medicine,* June, 1919, p. 361.

In Canada pensions are divided into 20 classes and awarded in direct proportion to the degree of disability, due to pulmonary tuberculosis, graded from 5 to 100 per cent:

Pensions are subject to a periodical review. If the medical advisors of the Board of Pension Commissioners find that the ex-patient's condition has improved, or grown worse, they reduce or raise the estimate of his disability percentage and he receives a corresponding decrease or increase of pension.

Class	Condition	Clinical Description	Employability	Percentage of Disability
No. 1	Not Improved			100
No. 2	Improved	When there has been improvement sufficient to allow use of the term.	These cases will in all likelihood relapse on any but the lightest kind of work. During the first six months at least the disability should be considered as total.	100
No. 3	Quiescent	No constitutional symptoms. Tubercle bacilli may be present or not. Stationary or better physical signs, all foregoing having been present at least 2 months.	Practically an active case under ordinary conditions of life and should rest 75 per cent of time in order to carry on in fair health—hence minimum of 80 per cent for first 6 months.	80–100
No. 4	Apparently Arrested	Signs of healed lesion without any symptoms for 3 months.	Should rest one-half of the time.	50–80
No. 5	Arrested	Signs of healed lesion without relapse at the end of 6 months under ordinary living conditions.	Should rest one-quarter of the time.	25–50
No. 6	Apparently Cured	Signs of healed lesion without relapse at the end of 2 months under ordinary living conditions.	Only limitation of employability is that patient should avoid undue exposure to dust and debilitating conditions.	25–50

Howard, Tasker: Later Stages of So-called War Nephritis. *American Journal of Medical Science,* Dec., 1919, clviii, No. 6, p. 844.

Thirty-seven cases were received at Camp Lee from overseas, with a diagnosis of nephritis. In these cases the period of onset varied from two to seven months. Three patients had had previous attacks of nephritis. Thirty-five had had edema at onset persisting, in 2 cases, up to the time of admission. In 26 cases teeth and tonsil examinations were made. Tonsillar disease was present in 10 and root infection in 4 cases. Albumin-

uria was present in 31 cases, and persisted in 24. Cylindruria persisted in 16 cases. Sodium chlorid excretion was normal. Polyuria was not uncommon, but when it occurred it was a valuable sign. Relative increase of night urine was practically constant in active cases, and was not infrequently the only anomaly in an apparent recovery. Blood urea above 35 mg. per 100 c.c. usually indicated nephritis, but normal readings were found in active cases. Moderate depression of phenolphthalein output was not an uncommon finding in those patients who had apparently recovered. An elevation of systolic blood-pressure was constant. In 7 active cases the diastolic pressure exceeded 100; in 11 active cases it was below 100. A moderate degree of anemia was common. No one factor was considered pathognomonic. Nineteen cases were discharged as recovered; 18 showed definite kidney pathology, and of the 18 one died of uremia. Nine showed a fair chance of recovery.

Thayer, W. S.: The Medical Aspects of Reconstruction. *The American Journal of Medical Sciences,* December, 1919, clviii, No. 6, p. 765.

In private practice physicians are apt to discharge patients before convalescence is complete. In the army there was a chance to study convalescence throughout the entire period of reconstruction. A systematic study of the following conditions was made by the neuropsychiatrists and gas experts:

(1) Neuroses and psychoneuroses.
(2) Mildly gassed cases.
(3) Psychoneuroses of a severe character.
(4) Convalescents from operations, various types of non-disabling wounds, gas intoxications, and disease.
(5) Effort syndrome group.
(6) Tuberculous group.

The problem cases of the field hospital were due to exhaustion, fear, mild gassing, and psychoneurosis. After the establishment of the system, 80 per cent of those sent to the field hospital were returned to the line. The base hospitals received the more serious cases. The neurological center at Lafauche (Base 117) returned 93 per cent to duty, 20 per cent to field duty and 7 per cent to the United States. At the orthopedic retaining center, Lt. Aignan accomplished excellent rehabilitation, especially by correcting bad shoeing. Following the English system, convalescent camps were planned near each base to receive the overflow of convalescents, and here they were given carefully devised physical and mental training in the form of graded exercises, setting-up exercises, drills, and marches, interlarded with rest and amusement under the direction of medical officers who had had training in cardiovascular work. Good results were obtained with the ordinary cases of effort syndrome. Suspected cases of tuberculosis were sent to special centers where proper study and special rehabilitation were given. The follow-up system at Convalescent Camp No. 2 gathered interesting data at two- and six-month intervals. Outside of the killed and wounded, 99 per cent of those returned to duty as Class A men were performing normal functions. These convalescent camps gave exceptional opportunities for studying systematically the ordinary medical and surgical conditions. Figures show that the average time of stay in hospitals and camps for tuberculosis was thirty-one days, for pneumonia fifty-eight days, for acute tonsilitis thirty-one days, for acute bronchitis thirty-six days, for herniotomy fifty days, for mumps thirty-nine days.

Convalescent departments would be of immense advantage for large industrial institutions, directly connected with the large hospitals under their supervision, and not convalescent homes. The work carried on at General Hospital No. 9 proved the value of physical and mental training of large bodies of slightly subnormal individuals, especially those of the functional cardiovascular group.

HYGIENE AND PUBLIC HEALTH

VAUGHAN, V. C.: Sex Attraction. *The Journal of Laboratory and Clinical Medicine,* Nov., 1919, v, No. 2, p. 114.

Dr. Vaughan gives a very thorough study of this subject, emphasizing especially the evolution of life from the asexual to the sexual form, the extent of differences between man and woman, the causes of sex attraction, the influence of sex for good or evil, the dangers of sex attraction and how to meet them, the way to deal with venereal disease, and the influence of heredity and environment on the sex question.

In no other species except the human is the exercise of the sex function so completely under the control of the individuals who possess it. This power of control places the responsibility where it belongs. It makes the parent responsible for the child. It makes the present generation responsible for generations to come.

The development of sex has led to differences in every part of the body, and has touched the finest and most delicate mechanism of life, even the intellectual and moral being, and it is probable that differences between the male and the female exist in every part of the body.

The point is made that absolute continence is compatible with health, efficiency and happiness, but that disease of the sexual glands is incompatible with any and all of these.

The differentiation which has been necessary in the development of the sexes in the genus homo has made one the complement of the other and has resulted in sex attraction, by which is meant the pleasure and the mental satisfaction that comes to two persons of opposite sex when brought into association, and which may be quite apart from the function of reproduction.

The dangers of the period of development in girls are brought out, and the need of proper instruction, lack of which may result in the girls going astray. When puberty is reached girls should know themselves and the dangers to which they are quite sure to be exposed. They should know the fundamental facts of anatomy, physiology, and hygiene, and their application to themselves. Ignorance has brought disaster. Let us try knowledge.

Boys should be told frankly about the effects of gonorrhea and syphilis. Chivalry should be played upon and the wrong to girlhood emphasized.

Houses of prostitution should be abolished, as their existence renders it all too easy for young men to do themselves irreparable harm.

Venereal diseases must be dealt with just as other infectious diseases are. The cases should be reported, just as small-pox is and the patients should be segregated, not in houses of prostitution, but in hospitals. To contract a venereal disease is not a crime, it is a misfortune; but to infect another with venereal disease is a crime, moral if not legal. Provided that a complete and unquestionable cure can be affected, the question of permitting marriage becomes strictly a moral one. A person should not be lastingly condemned for a mistake.

Both heredity and environment are important factors in the sex question. Proper association of the sexes is probably the strongest force in the uplift of the race; for who can measure the power for good that women have over men?

The central purpose of sex attraction is reproduction; therefore there should be something worthy to be reproduced. The silly moron girl is not the type for reproduction, nor is the vicious, immoral boy. Our efforts should be directed toward the extinction of both of these.

Hawes, J. B.: Experience of Massachusetts State Sanatoria for Tuberculosis During the Recent Influenza Epidemic. *Boston Medical and Surgical Journal,* Jan. 9, 1919, clxxx, No. 2, pp. 35-7.

The author gives reports of the steps taken in various state sanatoria for tuberculosis against the spread of influenza during the recent epidemic. Opinions differ somewhat in different cases. In the North Reading and Lakeville State Sanatoria, all patients and most of the employees were forbidden to leave the grounds or to receive visitors, except in the most urgent cases. Those who left the sanatorium were not allowed to return until after the epidemic subsided. Most of the employees and laborers received Dr. Leary's vaccine, with good preventitive results.

The Westfield State Sanatorium refused all leaves of absence and allowed no visitors. There was, however, infection from outside in one case, resulting in considerable spread of the disease. For treatment, tincture of aconite in doses of from 1 to 5 minims hourly in the febrile state, and in the case of children combined with sweet spirits of niter, was found very effective. Vaccine was not used.

At Rutland State Sanatorium the epidemic had taken hold before quarantine could be enforced. Leaves of absence and visitors forbidden until the epidemic subsided. Vaccine was given but was not considered to have any effect as more cases of the disease devloped in those who had been vaccinated than in the unvaccinated. The influenza did not cause any material change in the tuberculous process in the case of patients who contracted the disease. There were no cases among the unvaccinated patients and employees after the 263 (see table) had been given vaccine. This is probably due to the fact that precautions had been taken against the spread of the epidemic. The superintendent of the sanatorium does not consider that the efficacy of the vaccine has been either proven or disproven. The following table gives a summary of the results in all the sanatoria described:

Sanatorium (State)	Total Pop.	No. Pts.	No. Emp.	No. Vaccinated			Total Cases Influenza			Deaths
				Pts.	Em.	Tot.	Pts.	Em.	Tot.	
No. Reading	265	195	80	0	72	72	9	8	17	0
Lakeville	357	259	99	0	49	49	0	0	0	0
Westfield	370	265	101	0	0	0	46	7	53	4
Rutland	520	360	150	204	59	263	66	32	98	8

Bailey, B.: A Plea for the Education of Young Men as Nurses. *The Modern Hospital,* Jan., 1920, xiv, No. 1, p. 18.

In the Benjamin Bailey Sanatorium the training of nurses is on co-educational lines, the association resulting in benefit to both sexes. The demand for men systematically trained as nurses warrants a young man in taking up this profession. It is an education which is self-supporting while it is being acquired, and serves not only as a means of livelihood but as a basis for the possible study of medicine or dentistry later on.

Editorial: Placards Posted in Trains Produce Big Results. Sections on Venereal Diseases and the Hospital. *The Modern Hospital,* Jan., 1920, xiv, No. 1, p. 71.

The Government placards concerning diseases, posted during the past year in the toilet rooms of railroad cars and stations have resulted in many letters of inquiry being sent to the U. S. Public Health Service, 228 First Street, N. W., Washington, D. C. This organization is receiving as many as from 600 to 700 letters a week on the subject. Free information in the form of pamphlets is sent

to any one making application to the above address. The pamphlets are under six headings: (a) for young men; (b) for officials and the general public; (c) for boys; (d) for parents; (e) for girls and young women; (f) for educators.

SHAW, H. B.: Hospitals For the Treatment of Pulmonary and Other Forms of Tuberculosis. *British Medical Journal,* July 26, 1919, pp. 97-101.

The author emphasizes the fact that tuberculosis is contracted in childhood in nearly all cases, and that almost all individuals are infected at some time or other. There is a continual struggle between the individual resistance and the bacilli, in which either may win. Therefore tuberculosis sometimes appears only late in life, when the resistance is lessened, although the infection was contracted in childhood. Individual prophylaxis can not be thoroughly ensured under ordinary living conditions, and it is unfair to set apart and brand all tuberculosis patients, thus making it hard for them to earn a living. Therefore the author urges the following means of lessening the danger of infection:

(1) Observation Hospitals should be established for studying suspected cases.
(2) Invalid homes should be established where tuberculous patients who are unfit for work may be treated until they are well, or for the remainder of their lives (in incurable cases).
 (a) These homes should be in the heart of the city, where the families of patients may visit them.
 (*b*) Specially trained nurses should be provided.
(3) For wealthy patients who do not wish to remain in a hospital, specially trained private nurses should be provided.

CHAPIN, M. K.: Some Small Communities and What Their Hospitals Mean to Them. *The Modern Hospital,* Nov. and Dec., 1919, Jan., 1920, xiv, No. 1, p. 24.

In a series of three articles, Miss Chapin takes up this important problem. The health of the farming community is as vital a matter as that of the industrial one. A hospital needs not necessarily comform with certain specific requirements, however desirable these may be, but should first of all justify its existence by the measure of its service to the community.

Is the community better off with its hospital or without it, is the question to be answered. If the answer is "Yes" then all forces should combine to improve the service rendered.

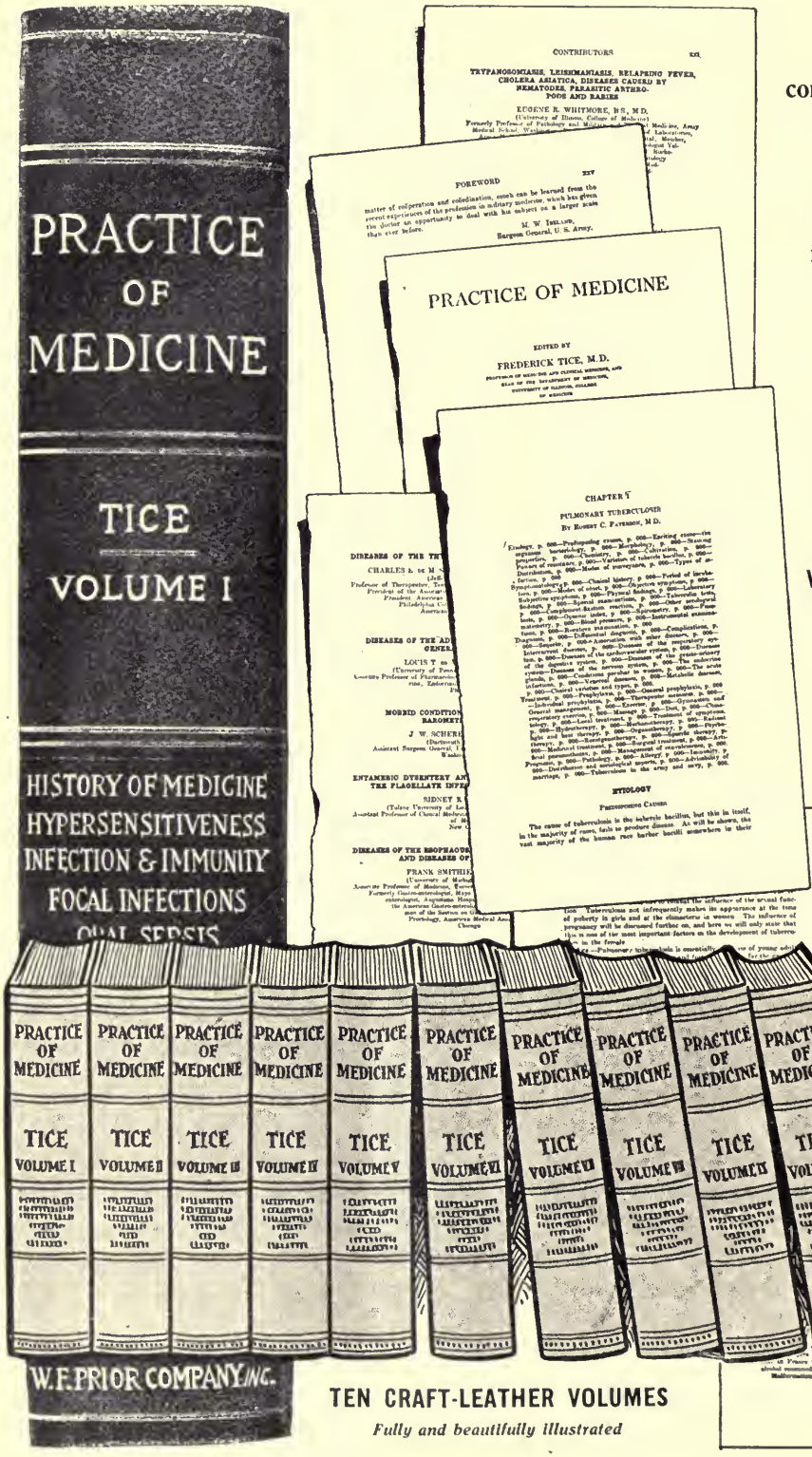
If there happen to be several small struggling hospitals in one area it would seem best not to attempt a full equipment of expensive laboratory and *x*-ray apparatus in each, but, by establishing full cooperation among them, to be assured of one laboratory where, with adequate facilities and trained workers, the needs of all the hospitals can be supplied.

The problems of a number of actual communities, which have been given fictitious names, are discussed, and suggestions are made. The evils of rivalry and competition between institutions in the same vicinity are shown in contrast with "a rural community and public health center which is not merely an institution but an embodiment of a constructive idea, with special emphasis laid upon the original features of social and medical organization and financial methods.

"A hospital may cease to be a repair shop, interested only in the cure of the patients within its walls, and become a social institution devoted to the prevention of disease, as well as an active educational force in the community."

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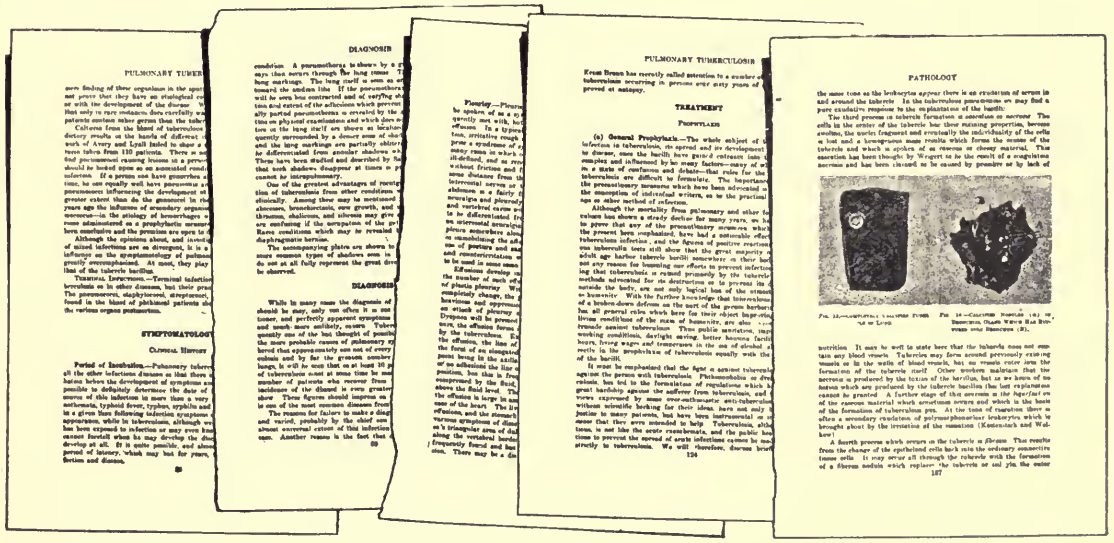
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Edward Quintard, M. D.
Herbert W. Rich, M. D.
Thomas F. Reilly, M. D.
C. G. Richards, M. D.
Ernest Reudiger, M. D.
Lee Wright Roe, M. D.
Adolph Sachs, M. D.
Charles E. De M. Sajous, M. D.
Thomas E. Satterthwaite, M. D.
John P. Schneider, M. D.
Elsworth Smith, M. D.
Willard A. Stone, M. D.
W. H. Stewart, M. D.
M. A. Starr, M. D.
Henry E. Tuley, M. D.
E. L. Tuohy, M. D.
Henry L. Ulrich, M. D.
Aldred Scott Warthin, M. D.
Luther F. Warren, M. D.
Louis M. Warfield, M. D.
Frank B. Wynn, M. D.

CANADA

E. P. Benoit, M. D.
J. A. Elliott, M. D.
John MacGregor, M. D.
John Lindsay, M. D.
J. H. McPhedran, M. D.
E. N. Montgomery, M. D.
Arthur W. Moody, M. D.

ANNALS OF MEDICINE

VOLUME I JULY, 1920 NUMBER 2

ROSTER OF MEMBERS OF THE AMERICAN COLLEGE OF PHYSICIANS TO JUNE 10, 1920

ALABAMA

Mobile

Roe, Lee Wright

ARKANSAS

Hot Springs

Deaderick, Wm. H.
Thompson, Lloyd

CALIFORNIA

Los Angeles

Brooks, Herbert F.
Browning, Charles C.
Byrnes, Ralph R.
Campbell, Ralph
Crispin, Egerton L.
Frick, Donald J.
Granger, A. S.
Hart, Lasher
Hunter, George Graham
King, Jos. M.
Lissner, Henry H.
Moore, Ross
Newton, E. Avery
Scott, A. J., Jr.
Soiland, Albert
Wessels, Walter F.

Monrovia

Pottenger, F. M.

Oakland

Strietman, Wm. H.

Pasadena

Condit, Joseph
Mixsell, Raymond B.
Newcomb, Arthur T.
Stone, Willard J.

CALIFORNIA—*Continued*

Sacramento

Gundrum, F. F.

San Diego

Pickard, Rawson J.
Pollock, Robert

San Francisco

Voorsanger, Wm. C.

COLORADO

Boulder

Gilbert, Oscar Monroe

Denver

Arndt, Rudolph W.
Arneill, James Rae
Bonney, Sherman G.
Burnett, C. T.
Hall, Josiah N.
Love, Tracy
Nenhaus, G. E.

DISTRICT OF COLUMBIA

Washington

Barnes, Noble P.
Morgan, William Gerry
Mallory, William J.
Roy, Phillip S.
Verbrycke, J. R., Jr.

FLORIDA

Jacksonville

Love, James

GEORGIA

Atlanta

Bunce, Allen H.
Roberts, Stewart R.

GEORGIA—*Continued*

Augusta
Mulherin, W. A.
Murphy, Eugene E.

ILLINOIS

Chicago
Babcock, Robert H.
Black, Robert A.
Blackwood, A. L.
Fantus, Bernard
Frick, Anders
Goldsmith, A. A.
Gray, Ethan Allen
Grubbe, Emil H.
Heintz, Ed. L.
Hoyne, Archibald L.
Karshner, Clyde F.
Kaufmann, Gustav L.
Krafft, Jacob C.
Leonard, Edward F.
Lewison, Maurice
Metcalf, Walter
Moyer, Harold
Norden, Henry A.
Orndoff, Benjamin
Patton, Joseph M.
Pietrowicz, Stephen R.
Portis, Milton M.
Quinn, Wm.
Sempill, Robert A.
Seufert, E. C.
Sheets, Vaughn L.
Smithies, Frank
Stearns, Wm. G.
Tice, Frederick
Trostler, I. S.

Decatur
Jack, Cecil M.

Elgin
Gabby, Samuel Lee
Hinton, Ralph

Jacksonville
Dollear, A. H.

Joliet
Werner, Frederick Wm.

Moline
Beam, Hugh A.

Peoria
Parker, George

ILLINOIS—*Continued*

Rockford
Weld, Anna

Springfield
Norbury, Frank Parsons

INDIANA

Fort Wayne
McCaskey, George W.

Indianapolis
Olsen, Alfred Berthier
Schweitzer, Ada E.
Wynn, Frank B.

IOWA

Keokuk
Fuller, Frank M.

Des Moines
Ryan, Granville M.
Throckmorton, Tom Bently

Fairfield
Gaumer, Stewart

Sioux City
Meis, Edw. Wm.
Shuman, John Wm.
Williams, Edw. M.

KANSAS

Halstead
Baumgartner, E. A.

KENTUCKY

Louisville
Barbour, Philip F.
Bayless, B. W.
Dowden, C. W.
Fleischaker, Frank W.
Jenkins, William A.
Lucas, Charles G.
Meyers, Sidney J.
Moren, John J.
Morrison, J. R.
Solomon, Leon L.
Thompson, Cuthbert B.
Tuley, Henry Enos
Young, W. J.

Lexington
Bradley, Ernest B.
McClymonds, Julian
Scott, John W.

KENTUCKY—*Continued*

Newport

Anderson, W. W.

LOUISIANA

New Orleans

Bass, C. C.
De Buys, L. R.
Lemann, Isaac Ivan
Lyons, Randolph

MAINE

Portland

Gehring, E. W.

MARYLAND

Annapolis

Bloedorn, W. A.

Baltimore

Beck, Harvey G.
Hemmeter, John C.
Leitz, Frederick
Miller, Sydney R.
Ruhrah, John
Shearer, Thomas L.
Zueblin, Ernest

MASSACHUSETTS

Boston

Austin, A. E.
Brown, Percy
Dana, Harold W.
McCrudden, Francis H.
Otis, Edward O.
Overlander, C. S.

Springfield

Chapin, Lawrence D.

West Newton

Paine, N. Emmons

Worcester

Baff, Max
Bigelow, Edward B.

MICHIGAN

Ann Arbor

Klingman, Theophil
Marshall, Mark
Parnall, C. G.

MICHIGAN—*Continued*

Battle Creek

Mortensen, M. A.
Nelson, A. W.
Pritchard, J. S.
Roth, Paul
Stewart, Charles D.

Detroit

Aaron, Charles D.
Biddle, Andrew Porter
Breisacher, Leo
Cleland, James, Jr.
Conner, Guy L.
Dempster, James H.
DeWitt, A. S.
Donald, William M.
Evans, William A.
Haas, Ernest
Harrison, Beverly Drake
Harvey, John Goold
Hickey, Preston M.
Hitchcock, Charles W.
Holmes, Arthus D.
Hoops, G. B.
Hoskins, Neal L.
Inglis, David
Kiefer, Guy L.
King, Dale M.
McKean, Geo. E.
Meloy, Carl R.
Mooney, Edward W.
Polozker, I. L.
Rich, Herbert M.
Sichler, E. H.
Starkey, Frank R.
Stephenson, Frank
Stevens, Rollin H.
Varney, H. R.
Watkins, John T.
Wendt, Leonard F. C.
Wilson, Walter, Jr.

Flint

Burr, C. B.
Clift, M. William
Knapp, M. S.
Marshall, William H.

Grand Rapids

Baker, Abel J.
Corbus, Burton R.
Gordon, T. D.

Grand Rapids—Continued
Johnston, Collins H.
Meengs, J. E.
Northrup, Wm.
Grandville
Brook, J. D.
Hancock
Fischer, Arthur F.
Kalamazoo
Crane, A. W.
Jackson, John B.
Lansing
Olin, Richard M.
Lapeer
Kay, W. J.
Monroe
Southworth, Chas. T.

MINNESOTA

Duluth
Linnemann, M. L.
Martin, Thomas Roy
Rowe, Olin W.
Scherer, C. A.
Tuohy, Edward L.
Minneapolis
Avery, J. Fowler
Drake, Charles
Henry, Clifford E.
Rizer, Robert I.
Robertson, H. E.
Schlutz, Frederick W.
Schneider, John P.
Ulrich, Henry L.
Rochester
MacCarty, Wm. C.
St. Paul
Gager, Edw. C.
Greene, Charles L.

MISSOURI

Kansas City
Duke, Wm. W.
Hoxie, George W.
Milne, Lindsay S.
Murphy, Franklin E.
St. Joseph
Bell, John M.

MISSOURI—*Continued*
St. Louis
Baumgarten, Walter
Brady, Jules M.
Butler, L. P.
Clemens, J. R.
Engelbach, William
Hughes, Mark R.
Lyter, J. Curtis
Neilson, Charles Hugh
Smith, Elsworth S.
Zahorsky, John

MONTANA

Helena
Fligman, Louis H.
Miles City
Brown, George E.

NEBRASKA

Lincoln
Mayhew, John Mills
Norfolk
Foster, Robert H.
Omaha
Bliss, Rodney W.
Christie, B. W.
Clarke, Floyd
Crummer, Leroy
Dunn, A. D.
McClanahan, H. M.
Milroy, Wm. F.
Riley, Bryan M.
Sachs, Adolph
Tyler, Albert F.

NEW JERSEY

Atlantic City
Alsop, Thomas
Stewart, W. B.
Elizabeth
Stern, Arthur
Glen Ridge
Wallace, Henry
Greystone Park
Fisher, Ernest M.
Hackensack
McFadden, J. Howard

NEW JERSEY—*Continued*

Hoboken
Gelbach, R. W.
Von Deesten, H. L.

Montclair
Mabey, J. Corwin

Newark
Beling, C. C.
Bumsted, C. V. R.
Connolly, Richard N.
Elliott, Daniel
Kraker, David A.
Teeter, Charles Edwin

Secaucus
Pollak, B. S.

Trenton
McDonald, J. O.

NEW YORK

Albany
Conway, Fred C.
Rooney, James F.

Brooklyn
Andresen, A. F. R.
Bartley, E. H.
Blatteis, Simon R.
Block, Siegfried
Brush, Arthur C.
Butler, Glenworth
Clark, Raymond
Cornwall, Edward E.
Cross, Frank B.
Cruikshank, William J.
Eastmond, Chas.
Evans, George A.
Fairbairn, Henry A.
Forbes, George
Gordon, Murray B.
Gutman, Jacob
Ives, Robert F.
Joachim, Henry
Kandt, Hartwig
Kerr, LeGrand
Kingman, Robert
Little, George F.
Louria, Leon
Ludlum, Walter D.
Macumber, John L.
Meagher, John F. W.
Moser, William

Brooklyn—Continued
Moses, Henry B.
Northridge, W. A.
Parrish, Paul L.
Reque, P. A.
Smith, Archibald D.
Van Cott, J. M.
Wallace, Wesley H.
Warren, Luther
Webster, Henry C.
Wolfer, Henry

Buffalo
Benedict, A. L.
Cornwall, N. G.
Kauffman, Lesser
Rice, James F.
Ullman, Julius
Walsh, Thomas J.

Clifton Springs
Woodbury, Malcolm S.
Winter, Henry Lyle

Forest Hills
Chalmers, Thomas C.

New York City
Baketel, H. Sheridan
Bassler, Anthony
Berg, Henry W.
Bishop, Ernest S.
Bishop, James
Bishop, Louis F.
Blumgarten, A. S.
Bovaird, David
Brooks, Harlow
Burr, Chauncey L.
Byrne, Joseph Henry
Byrne, Joseph
Caille, Augustus
Carman, Albro R.
Coleman, Daniel E.
Cooke, Robert A.
Fisch, Gustaf Grant
Friedman, G. A.
Goodhart, S. Philip
Grossman, Morris
Herrick, W. W.
Herrman, Charles
Hirsch, Isaac S.
Holland, Arthur L.
Hollis, A. W.
LeWald, Leon T.

New York City—Continued
Maier, Otto
Mannheimer, George
McKendree, Chas. E.
Meyer, Alfred
Nagle, James F.
Pease, Marshall C., Jr.
Quackenbos, Henry F.
Quintard, Edward
Reilly, Thomas F.
Rottenberg, I. M.
Sachs, L. B.
Satterthwaite, Thomas E.
Shelby, Edmund P.
Stark, Morris
Stewart, W. H.
Strodl, George T.
Sturtevant, Mills
Wallace, Wesley H.
Weber, Leonard G.
Wilcox, Reynold Webb
Poughkeepsie
Hill, Eben C.
Rochester
Button, Lucius
Darrow, Charles
Mulligan, Wesley T.
Sutter, C. Clyde
Williams, J. R.
Schenectady
Betts, Lester
Ham, Stillman S.
Scott, J. M. W.
Stone, W. B.
Vander, Bogart F.
Staplcton, S. I.
Foster, Albert D.
Syracuse
Gould, L. A.
Larkin, Albert E.
Levy, Harris I.
Loveland, B. C.
Watkins
Ferris, A. W.

NORTH CAROLINA

Charlotte
Munroe, John P.
Hoke County
McBrayer, L. B.

NORTH DAKOTA

Bismarck
Arnson, Julius O.
Ruediger, Ernest W.
Mandan
Altnow, H. O.

OHIO

Cincinnati
Bettman, Henry Wald
Cleveland
Cummer, C. L.
Phillips, John
Stone, Charles W.
Stoner, C. Willard
Springfield
Syman, Louis L.
Toledo
Brown, N. Worth
Levinson, Louis
Salzman, Samuel R.
Tenney, C. F.
Zbinden, Theodore
Youngstown
Morrison, Robert M.
Patrick, Harry E.

OKLAHOMA

Norman
Ellison, Gayfree
Oklahoma City
Andrews, Leila E.
Chase, A. B.
Fishman, C. J.
Moorman, L. J.
Riely, Leander A.
White, Arthur W.

OREGON

Portland
Baar, Gustav
Koehler, George F.
Matson, Ralph C.
Selling, Lawrence

PENNSYLVANIA

Germantown
Kelley, Thomas C.
Johnstown
Stewart, H. M.

PENNSYLVANIA—*Continued*

Philadelphia

Allyn, Herman B.
Bernstein, Ralph
Beardsley, Edward J. G.
Gordon, Alfred
Mills, H. B.
Musser, John H., Jr.
Rehfuss, Martin E.
Robertson, William E.
Roussell, Albert E.
Sajous, Chas. E. deM.
Stewart, F. E.

Pittsburgh

Barach, Joseph H.
Billings, F. T.
Gardner, E. R.
George, S.
Grayson, Thomas Wray
Grier, George
Haythorn, Samuel
Hollander, Lester
Johnston, George C.
Johnston, J. I.
Jones, Clement R.
Lichty, John A.
McCreedy, E. Bosworth
McKelvey, James P.
Mercur, Wm. H.
Ohail, Joseph C.
Schwartz, Lorraine L.
Thorne, John Mairs
Utley, F. B.
Wolff, Jacob

York

Comroe, Julius H.
Holzapple, C. E.

RHODE ISLAND

Providence

Farnell, Fred J.

TENNESSEE

Memphis

Krauss, William
Leroy, Louis
McElroy, J. B.
Warr, Otis

TEXAS

Houston

Agnew, James H.
Waples, F. A.

UTAH

Salt Lake City

Gibson, C. Cattett
Richards, G. G.

VERMONT

Burlington

Beecher, Clarence Henry

VIRGINIA

Charlottesville

Davis, John S.

Richmond

Brown, Alex G.
Gray, Alfred L.
Hodges, J. Allison
Hutcheson, J. M.
McGuire, Edward
Shepard, William A.
Tucker, Beverley R.
VanderHoof, Douglas

WASHINGTON

Seattle

Blackford, J. M.
Heussy, William C.
Stith, Robert M.

Tacoma

Brown, J. R.
Wilson, C. Stewart

WEST VIRGINIA

Clarksburg

Cherry, Solomon

Huntington

Vest, Walter E.

WISCONSIN

Fond du Lac

Calvy, P. J.
Layton, Oliver M.

Milwaukee

Henes, Edwin, Jr.
Jermain, Louis
McJunkin, Frank A.

Milwaukee—Continued
Patek, Arthur J.
Warfield, Louis M.

CANADA

Brandon, Manitoba
Carter, L. J.

London, Ontario
Crane, James W.
Ferguson, J. I.
Fischer, S. M.
Hale, George C.
Hughes, F. W.
Lindsay, John C.
MacGregor, John

Montreal, Quebec
Benoit, Em. P.

CANADA—*Continued*

Toronto
Elliott, J. H.
Loudon, J. D.

Winnipeg, Manitoba
Burridge, A. J.
Cadham, F. T.
Chestnut, William
Hunter, Charles
Mackey, Hugh
McMillan, J. Currie
Montgomery, E. W.
Moody, A. W.
Murdoff, H. M.
Rogers, William
Young, Fred A.

ROSTER OF MEMBERS OF THE AMERICAN CONGRESS ON INTERNAL MEDICINE TO JUNE 10, 1920

Alabama

Mobile
Roe, Lee Wright

Arizona

Globe
Kirmse, Alvin

Arkansas

Hot Springs
Deaderick, Wm. H.
Eckel, Geo. Mitchell
Thompson, Lloyd

Little Rock
Bathhurst, Wm. R.

California

Burbank
Rossiter, Frederick

Colfax
Peers, Robert

Glendale
Harrower, Henry
Keller, P. M.

Los Angeles
Barrow, John V.
Brooks, Herbert F.
Browning, Charles C.
Byrnes, Ralph
Campbell, Ralph R.
Crispin, Edgerton L.
Crum, Robert
Cummings, Rolland
Fishbaugh, E. C.
Frick, Donald
Granger, Arthur S.
Hart, Lasher
Hunter, George G.
King, Jos. M.
Lissner, Henry H.
Moore, Ross
Newton, E. Avery
Orbison, Thomas J.
Piness, George

Los Angeles—Continued
Scott, Alfred James, Jr.
Soiland, Albert
Taylor, F. W. Howard
Wessels, Walter
Visscher, L. G.

Monrovia
Pottenger, Francis M.

Oakland
Rowe, Albert H.
Strietman, Wm. H.

Pasadena
Breed, Lorena M.
Condit, Joseph
Luckie, James
Mackerras, R. H.
Mixsell, Raymond
Newcomb, Arthur T.
Stone, Willard J.
Wilson, J. M.

Redlands
Folkins, Frank H.

Riverside
Simonds, Paul E.

Sacramento
Gundrum, F. F.
Snyder, J. R.

San Diego
Churchill, James F.
Nielsen, John C. E.
Pickard, Rawson
Pollock, Robert
Yates, John C.

San Francisco
Lux, Frederick W.
Spier, Harry
Voorsanger, Wm. C.

San Leandro
Miller, Charles Howard

Colorado

Boulder
Gilbert, Oscar Monroe

COLORADO—*Continued*

Denver

Amesse, J. W.
Arndt, Rudolph W.
Arneill, James Rae
Bonney, Sherman G.
Burnett, C. T.
Hall, Josiah N.
Love, Tracy
Neuhaus, G. E.
Waring, James J.

CONNECTICUT

Bridgeport

Lynch, John C.

Hartford

Altshul, H.
Witter, Orin R.

New Haven

Gompertz, Louis M.
Levy, Louis Henry

DISTRICT OF COLUMBIA

Washington

Barnes, Noble P.
Conklin, C. B.
Grayson, Cary T.
Heller, Joseph M.
Lee, Thomas S.
Mallory, Wm. J.
Morgan, Wm. G.
Reed, Edward H.
Roy, Philip S.
Verbrycke, J. Russel

FLORIDA

Jacksonville

Love, James
McGinnis, R. H.

Miami

Benton, G. H.

GEORGIA

Atlanta

Bunce, Allen H.
Lawrence, Charles Ed.
Paine, C. H.
Strickler, C. W.

GEORGIA—*Continued*

Augusta

Mulherin, W. A.
Murphy, Eugene E.
Roberts, Stuart R.

LeGrange

Huck, J. Gardiner

Macon

Spencer, Jacob John

ILLINOIS

Chicago

Anderson, James L.
Babcock, Robert H.
Berghoff, Robert S.
Black, Robert Alfred
Blackwood, A. L.
Block, Leon
Cramp, Arthur J.
Cross, Edwin
Fantus, Bernard
Favill, John
Ferguson, Clara
Frick, Anders
Frinch, Robert L.
Futterer, Gus A.
Goldberg, Benjamin
Goldsmith, A. A.
Graves, Nathaniel A.
Gray, Ethan A.
Gray, Herbert W.
Grubbe, Emil
Gruskin, B.
Heintz, Edward L.
Hickenlooper, C. B.
Hoyne, Archibald L.
Hubeny, Maximilian John
Jacques, John L.
Karshner, Clyde F.
Kaufmann, Gustav
Krafft, Jacob C.
Leonard, Edward F.
Lewison, M.
Martin, Albert
Meling, Nelson C.
Metcalf, Walter B.
Moyer, Harold
Norden, H. A.
Orndoff, Benjamin
Patton, Joseph M.

Chicago—Continued
Pietrowicz, S. R.
Portis, Milton M.
Post, Geo. W.
Quinn, Wm.
Roach, Richard A.
Sempill, Robert A.
Seufert, E. C.
Sheets, Vaughn L.
Slaymaker, S. R.
Smithies, Frank
Stearns, Wm. G.
Tice, Frederick
Torpey, James F.
Trostler, I. S.
Weatherson, John
Withers, G. H.
Cicero
Barnes, James
Danville
McCaughey, Robert S.
Elgin
Gabby, S. L.
Hinton, Ralph
Decautur
Jack, Cecil
Evanston
Hastings, W.
Hoopeston
Jones, Leroy
Joliet
Werner, Frederick Wm.
Moline
Beam, Hugh A.
Peoria
Brown, D. A.
Cutler, Wm. W.
Meixner, Fred M. F.
Parker, George
Vonachen, J. R.
Rockford
Anthony, R. E.
Mosley, H. P.
Weld, Anna
Springfield
Herudon, Richard F.
Norbury, Frank Parsons
Trapp, Albert R.
Winnetka
Blatchford, F. W.

INDIANA

Fort Wayne
McCaskey, George
Indianapolis
Ketchum, Jane M.
Kiser, E. F.
Lapenta, Vincent A.
Olsen, Alfred B.
Schweitzer, Ada
Wynn, Frank B.
LaFayette
Lairy, M. M.
South Bend
Cooper, A. L.
Sensenich, R. L.

IOWA

Centerville
Marker, John I.
Davenport
Decker, H. M.
Lamb, Fred G.
Des Moines
Bierring, Walter L.
Ryan, Granville N.
Strawn, J. T.
Throckmorton, Tom B.
Welpton, Hugh G.
Dubuque
Keogh, John V.
Fairfield
Gaumer, James Stewart
Keokuk
Fuller, Frank
Maquoketa
Bowen, A. B.
Mason City
Farrell, V. A.
Sioux City
Meis, E. W.
Shuman, John W.
Williams, Edw. M.
Webster City
Galloway, M. B.

KANSAS

Halstead
Baumgartner, E. A.
Herington
Reichley, Elmer J.

KANSAS—*Continued*

Lawrence
Nelson, C. F.
Milford
Brinkley, John R.
Wichita
Hoffman, J. Z.
Jager, T. J.

KENTUCKY

Lexington
Bradley, Ernest B.
McClymonds, Julian
Scott, John W.
Louisville
Barbour, Philip F.
Bate, R. Alex.
Bayless, B. W.
Dowden, C. W.
Finck, T. D.
Fleischaker, F. W.
Frazier, Ben Carlos
Graves, Stuart
Griswold, Alex. V.
Hays, George
Horine, Emmet F.
Jenkins, William A.
Keith, D. Y.
Kirk, J. Allen
Lucas, C. G.
Meyers, Sidney J.
Moore, John Walker
Moren, John J.
Morrison, J. R.
Nickell, A. W.
Solomon, Leon L.
Speidel, Fred G.
Thompson, Cuthbert
Tuley, Henry Enos
Young, W. J.
Newport
Anderson, W. W.

LOUISIANA

New Orleans
Bass, Charles
De Buys, L. R.
Lemann, Isaac Ivan
Lyons, Randolph H.
New Orleans—Continued
Tichenour, G. H., Jr.
Van Wart, Roy M.

MAINE

Portland
Burrage, Thomas J.
Gehring, E. W.

MARYLAND

Annapolis
Bloedorn, W. A.
Baltimore
Beck, Harvey G.
Hemmeter, John C.
Hirschmann, Isador I.
Leitz, Frederick
Miller, Syndey R.
O'Mara, John T.
Ruhrah, John
Shearer, Thos. L.
Zueblin, Ernest
Snow Hill
Riley, John L.

MASSACHUSETTS

Boston
Austin, A. E.
Bangs, Charles H.
Briggs, L. Vernon
Brown, Percy
Dana, Harold W.
Granger, Frank B.
Jelly, Arthur C.
McCrudden, Francis H.
Otis, Edward O.
Overlander, C. L.
Melrose
Ruble, Wells Allen
Smith, John Hall
Salem
Sargent, Ara N.
Springfield
Bacon, Theodore S.
Chapin, Lawrence D.
West Newton
Paine, N. Emmons
Worcester
Baff, Max
Bigelow, Edward B.

MICHIGAN

Ann Arbor

Cowie, David Murray
Gordon, Wm. Henry
Klingman, Theophil
Marshall, Mark
Parnell, C. G.
Warthin, Alfred Scott
Van Schoick, John

Battle Creek

Heald, C. W.
Mortensen, M. A.
Nelson, A. W.
Pitchard, J. S.
Roth, Paul
Stewart, Charles E.

Bay City

Baird, Fred S.
McLurg, John

Detroit

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Biddle, Andres Porter
Breisacher, Leo
Buesser, Frederick G.
Carlucci, P. F.
Carstens, Henry R.
Chester, John L.
Cleland, James, Jr.
Clippert, Frederick
Conner, Guy L.
Dempster, James H.
DeWitt, A. S.
Donald, William M.
Evans, W. A.
Haas, E. W.
Harrison, Beverly Drake
Harvey, John Goold
Hickey, Preston M.
Hitchcock, Chas. W.
Holmes, Arthur
Hoops, G. B.
Hoskins, Neal L.
Inglis, David
Ives, Augustus W.
Jennings, C. G.
Jennings, Alpheus F.
Kiefer, Guy L.
King, Dale M.
Lee, John
Lockwood, Bruce C.

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McGraw, Theo. A., Jr.
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McNaughton, Geo. P.
Meloy, Carl R.
Mooney, Edward W.
Polozker, I. L.
Rich, Herbert M.
Schmidt, Harry B.
Sherman, G. H.
Sichler, E. H.
Stapleton, Wm. J.
Starkey, Frank R.
Stephenson, Frank
Stevens, Rollin
Stiles, C. H.
Ulrich, Henry L.
Van Rhee, George
Varney, H. R.
Vreeland, C. Emerson
Watkins, John T.
Wendt, Leonard F. C.
Wilson, Walter J.

Flint

Burr, C. B.
Clift, M. Wm.
Knapp, M. S.
Marshall, William H.
Morrish, Ray S.

Grand Rapids

Baker, Abel J.
Corbus, Burton R.
Gordon, T. D.
Irwin, Thomas C.
Johnston, Collins H.
Meengs, J. B.
Moore, Vernon
Northrup, Wm.
Wells, M.

Granville

Brook, J. D.

Hancock

Fischer, Arthur F.

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Bliss, Guy L.
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Jackson, John B.

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Papeer
Kay, W. J.

Monroe
Southworth, Chas.

Munising
Trueman, G. A.

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Martin, T. R.
Rowe, Olin W.
Scherer, C. A.
Tuohy, E. L.

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Beard, Archie
Crafts, Leo M.
Drake, Charles
Gardner, Edward L.
Head, George Douglas
Henry, Clifford E.
Morrison, A. W.
Peppard, Thomas Albert
Rizer, Robert I.
Robertson, H. E.
Schlutz, Frederick W.
Schneider, John P.
Ulrich, Henry L.

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Hartman, Howard R.
MacCarthy, Wm. C.

St. Paul
Burns, Robert M.
Gager, Edward C.
Greene, Charles Lyman
Hall, Alexander
Hoff, Peder A.
Lepak, John A.

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Hoxie, George H.
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McPherson, Owen P.
Milne, Lindsay S.
Murphy, Franklin E.
Myers, Wilson A.
Wolfe, I. J.

St. Joseph
Bell, John M.

St. Louis
Baumgarten, Walter
Brady, Jules M.
Butler, L. P.
Clemens, J. R.
Engelbach, William
Falk, O. P. J.
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Ives, George
Lyter, J. Curtis
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Smith, Elsworth
Zahorsky, John

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Coulter, F. E.

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Dunn, A. D.
McClanahan, H. M.
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Riley, Bryan
Sachs, Adolph
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Stern, Arthur
Glen Ridge
Wallace, Henry
Greystone Park
Donnet, John Victor
Fisher, Ernest M.
Henschel, Louis K.
Thorne, Frederick H.
Hackensack
McFadden, G. Howard
Hoboken
Gelbach, Rudolph W.
Von Deeisten, Henry T.
Jersey City
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Montclair
Mabey, John Corwin
Newark
Beling, C. C.
Bumsted, C. R.
Connolly, Richard
Dowd, Ambrose F.
Elliott, Daniel
Lowrey, James H.
Martland, Harrison
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Teeter, Charles E.
Nutley
Whelan, Edward P.
Paterson
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Rockaway
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Trenton
McDonald, John O.

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Lappeus, John C. S.
Overton, W. S.
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Andersen, A. F. R.
Aten, William H.
Banowitch, Morris M.
Bartley, E. H.
Betz, Isidore
Blatteis, Simon R.
Block, Siegfried
Brockway, Robert O.
Brown, Samuel S.
Brush, Arthur C.
Bunker, Henry A.
Butler, Glentworth R.
Chapin, Edward
Clarke, Raymond
Collins, John J.
Cornwall, E. E.
Coughlin, Robert E.
Cross, Frank Bethel
Cruikshank, Wm. J.
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DeLorme, M. F.
DeYoanna, A.
Dobkin, Nicholas
Eastmond, Charles
Evans, George A.
Fairbairn, Henry A.
Fisher, Charles M.

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Gutman, J.
Hangarter, Andrew H.
Hoxsie, Edward H.
Hubbard, W. S.
Ives, Robert F.
Joachim, Henry
Kandt, Hartwig
Kerr, LeGrand
Keyes, E. P.
Kingman, Robert
Klein, A.
Little, George F.
Louria, Leon
Ludlum, W. D.
Macumber, John L.
MacEvitt, James M.
Meagher, John F. W.
Moser, William
Moses, Henry Monroe
Nash, Philip I.
Northridge, Wm. A.
Parrish, Paul L.
Reque, P. A.
Smith, Archibald D.
Smith, Joseph E.
Somers, J. A.
Van Cott, J. M.
Wallace, Wesley H.
Warren, L. F.
Webster, Henry G.
Wheeler, Robert T.
Wolfer, Henry

Buffalo

Benedict, A. L.
Cohen, Bernard
Eckel, John L.
Gibson, Arthur R.
Jones, Allen A.
Kauffman, Lesser
Love, F. W.
Lytle, Albert T.
Patterson, Harold A.
Pryor, John H.
Rice, James Francis
Rochester, DeLancey
Russell, Nelson G.

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Thoma, Fridolin
Ullman, Julius
Walsh, Thomas J.

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Burns, Geoffrey Chas. H.
Reed, Ralph G.
Vaux, Chas. L.

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Woodbury, Malcolm
Wright, Floyd
Winter, Henry Lyle

Elmhurst

Schweigart, Fred J.

Forest Hills

Chalmers, Thomas C.

Mt. McGregor

Houk, Horace John

Mt. Kisco

Curry, G. P. M.

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Baketel, H. Sheridan
Bassler, Anthony
Berg, Henry W.
Bieber, Joseph
Bishop, Ernest S.
Bishop, James
Bishop, Louis F.
Blumgarten, A. S.
Bovaird, David
Brooks, Harlow
Burr, Chauncey L.
Byrne, Joseph H.
Byrne, Joseph
Caille, Augustus
Carman, Albro R.
Coleman, Daniel S.
Cooke, Robert A.
Davis, E. Elbert
Diner, Jacob
Donovan, Daniel J.
Egan, Cornelius J.
Edson, David Orr
Eichler, Philip
Field, C. Evertt
Fisch, Gustav Grant
Friedman, G. A.
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Goodridge, Malcolm

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Hatch, Leffingwell
Herrick, W. W.
Herrman, Charles
Hirsch, Isaac
Holland, Arthur L.
Hollis, A. Wm.
Hollister, Frank C.
Horowitz, Philip
Hunt, Edward L.
James, Walter B.
Jutte, Max Ernest
Katzenback, W. H.
Kraus, Walter Max
Laport, George L.
Levy, I. J.
LeWald, Leon T.
Lewi, Emily
Lewis, H. Edwin
Lieb, Clarence W.
McKendree, Chas. A.
McSweeney, E. S.
Maier, Otto
Mannheimer, George
Meltzer, Victor
Meuer, S. H.
Meyer, Alfred
Monae-Lesser, Mozart
Mooney, Louis M.
Nagle, James F.
Norman, M. Philip
Pease, Marshall C.
Pfeiffer, Felix
Philip, Carlin
Pumyea, P. C.
Quackenbos, H. F.
Quintard, Edward
Raminez, Max A.
Reilly, Thomas F.
Richardson, E. J.
Robinson, D.
Rothenberg, L. H.
Rottenberg, I. M.
Sachs, L. B.
Satterthwaite, Thos.
Schapira, S. Wm.

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Sheldon, Wm. H.
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Stark, M.
Stella, Antonio
Stewart, Wm. H.
Strodl, George T.
Sturtevant, Mills
Thom, Burton Peter
Titus, Edward C.
Turck, Fenton B.
Wachsmann, S.
Weber, Leonard G.
Weinstein, Julius W.
Weiss, Samuel
Welker, Franklin
Wilcox, R. W.
Wilson, George A.
Youngling, George S.

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McBlaine, Thomas J.

Ogdensburg
Cooper, W. Grant

Poughkeepsie
Hill, Eben C.
Von Tiling, Johannes

Rochester
Button, Lucius L.
Darrow, Charles E.
Ewers, Wm. V.
Jackson, Edward W.
Lath, E. M.
Mulligan, Wesley T.
Sutter, C. Clyde
Swan, John M.
Williams, J. R.

Schenectady
Betts, Lester
Collie, Roy M.
Faust, Louis
Goddard, Walter W.
Ham, Stillman S.
Reed, Fred C.
Scott, J. M. W.
Stone, Warren B.
Vander, Bogart Frank

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Kaufman, Franklin J.
Larkin, Albert E.
Levy, I. Harris
Loveland, B. C.
Reifenstein, Edw. C.
Wiseman, Joseph R.

Stapleton
Foster, Albert D.

Troy
Stillman, Edgar R.

Utica
Dill, George H.

Watkins
Ferris, Albert W.

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Munroe, John P.
Nisbit, Walter O.

Hoke County
McBrayer, L. B.

High Point
Hiatt, Houston B.

Raleigh
Anderson, Albert

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Arnson, Julius O.
Ruediger, Ernest Henry

Mandan
Altnow, H. O.

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Held, Charles E.

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Bettman, Henry Wald
Greiwe, John E.
Stix, Walter H.
Wendel, Henry C.

Columbus
Sheetz, John W.
Whitaker, H. W.

Cleveland
Berger, Samuel S.
Cummer, C. L.

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Fliedner, G. B.
Philips, John
Stone, Charles W.
Stoner, Willard C.
Updegraff, Ralph K.

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Young, Fillmore

Richwood
Roebuck, L. L.

Springfield
Syman, Louis L.

Steubenville
Bradley, John A.
Miller, J. E.

Toledo
Brown, N. Worth
Levisson, Louis A.
Salzman, Samuel
Tenney, C. F.
Waggoner, C. W.
Zbinden, Theodore

Warren
Manley, O. T.

Youngstown
Jones, E. Henry
Morrison, R. M.
Patrick, H. E.
Rosenblum, Alex. M.
Welch, H. E.

OKLAHOMA

Chickasha
Leeds, Alexander B.

Norman
Ellison, Gayfree

Oklahoma City
Andrews, Leila E.
Chase, A. B.
Fishman, C. J.
Moorman, L. J.
Riely, Leander A.
White, Arthur W.

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Baar, Gustav
Brill, I. C.

Portland—Continued
Koehler, George F.
Matson, Ralph C.
Selling, Lawrence

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Ashland
Biddle, Robert
Chester
Wood, John Wm.
Clerk's Summit
Imhoff, Wm. H. M.
Corry
Christie, A. C.
Donora
Lewis, Wm. H.
Germantown
Kelly, T. C.
Johnstown
Stewart, H. M.
Norristown
Christian, T. B.
Oil City
McLain, Paul J.
Philadelphia
Allyn, Herman
Anders, James
Beardsley, Ed.
Bernstein, Ralph
Daland, Judson
Dercum, F. X.
Dickinson, H. S.
Gordon, Alfred
Loewenburg, S. A.
Mills, H. B.
Musser, John H. J.
Oliensis, A. E.
Reeves, Rufus S.
Rehfuss, M. E.
Robertson, Wm. E.
Roussel, Albert
Sajous, Charles E. deM.
Smith, Ernest B.
Stewart, F. E.
Warmuth, M. P.
Pittsburgh
Alexander, J. Hope
Barach, Jos. H.
Pittsburg—Continued
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Billings, F. T.
Gardner, E. R.
George, S.
Grayson, Thomas W.
Grier, George W.
Haythorn, Sam
Hollander, Lester
Hood, Robert T.
Johnston, G. C.
Johnston, J. I.
Jones, Clement R.
Lichty, John A.
Litchfield, L.
Mayer, Ed. E.
Mayer, W. H.
McCready, E. B.
McKelvey, J. P.
Mercur, Wm. H.
Ohail, J. C.
Palmer, G. A.
Pettit, Albert
Schwartz, L. L.
Sherrill, A. W.
Shilen, J.
Simonton, T. A.
Thorne, J. M.
Utley, F. B.
Westervelt, H. C.
Wolf, Jacob
Zeedick, Peter I.
Zugsmith, Edwin
Reading
Bertolet, Wm. S.
Republic
Kimmel, W. S.
South Bethlehem
Butler, Thomas
Uniontown
Smith, Charles H.
Vandergrift
Speer, Ross H.
Washington
Sargent, L. D.
Wilkes-Barre
Collins, Daniel W.
Kaufman, Albert

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Comroe, Julius H.
Holtzapple, G. E.

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SOUTH CAROLINA

Florence
Barnwell, John M.

SOUTH DAKOTA

Java
Rosenthal, Sigmond

TENNESSEE

Knoxville
Bowen, William
Memphis
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Cullings, Jesse J.
Fontaine, Bryce W.
Krauss, Wm.
Jones, Frank A.
Leroy, Louis
McElroy, J. B.
Rudner, Henry G.
Swink, Walter T.
Warr, Otis
Nashville
Dunklin, F. B.
Witherspoon, John A.

TEXAS

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Calvert, W. J.
Galveston
Chapman, L. E.
Graves, M. L.
Levy, Moise D.
Stone, C. S.
Houston
Agnew, James H.
Finsand, Victor
Waples, F. A.
Temple
Gober, O. F.

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Cochran, Geo. A.
Gibson, Catlett T.
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Richards, G. G.
Silver, Edw. V.

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Burlington
Beecher, Clarence Henry

VIRGINIA

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Richmond
Gray, Alfred L.
Hodges, Fred M.
Hodges, J. Allison
Houser, A. A.
Hutcheson, J. M.
McGuire, Edward
Shipard, Wm. A.
Tucker, Beverly R.
VanderHoof, Douglas

WASHINGTON

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Blackford, J. M.
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Tacoma
Brown, J. R.
Wilson, C. Stuart

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Vest, Walter E.

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Post, C. C.
Fond du Lac
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Layton, Oliver M.
Madison
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Carter, Homer M.
Fahr, Geo. Elveston
Marshfield
Milbee, H. H.
Turgasen, F. E.
Milwaukee
Henes, Edwin
Jermain, Louis
McJunkin, Frank A.
Patek, Arthur J.
Warfield, Louis M.
Oshkosh
Andrews, Neil
Werner, O. E.

WYOMING

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Thompson, A. P.

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Montreal, Quebec
Benoit, Em. P.
Shedden, Ontario
Aitkin, G. W. A.
Toronto, Ontario
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London, J. D.
McPhedran, J. H.
Minns, F.
Winnipeg, Man.
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Cadham, F. T.
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Hunter, Charles
Mathers, Alvin T.
Mackay, Hugh
McMillan, J. Currie
Montgomery, E. W.
Moody, Arthur W.
Murdoff, H. M.
Rogers, William
Young, Fred A.



JOHN CHALMERS DA COSTA, JR.

Born, 1871—Died, April 26, 1920

Graduated from the Jefferson Medical College 1893. Late Associate Professor of Medicine in his Alma Mater and Councilor of the American Congress on Internal Medicine; eminent Clinician and Author.

EPIDEMIC ENCEPHALITIS

A STUDY OF SEVENTY-FIVE CASES WITH SIXTEEN AUTOPSIES*

BY WILLIAM BOYD, M.D., M.R.C.P.Edin.,

Professor of Pathology, University of Manitoba,

Winnipeg, Man.

PART I

EPIDEMIC encephalitis has come and gone. Sporadic cases still occur, but the main brunt of the attack is spent. It is a suitable time, therefore, to consider what we have learned of the nature of the disease, and to study somewhat more in detail some features of its epidemiology, symptomatology and pathology.

Epidemiology.—The epidemic commenced in that hotbed and breeding place of epidemic diseases, the south-eastern corner of Europe. "Westward the path of Empire takes its way", and westward moves the epidemic wave. Time and again we may watch an epidemic disease arise in the near East and move westward along the lines of commerce and travel, till it makes a farewell appearance on the American continent. This westward march is well exemplified by the present epidemic. The disease was first recognized in Vienna in the spring of 1917, where it was christened by von Economo, unfortunately I think, "encephalitis lethargica". In the spring of 1918 cases were reported in Paris by Netter and in England by numerous observers. By the beginning of 1919 the infection had crossed the Atlantic, and epidemics of varying proportions were reported in New York and the Eastern states, later in the middle West, and finally on the Pacific coast.

The disease reached Winnipeg in the last week of October, 1919, and gave rise to an epidemic which, for the size of the city, was most extensive. I am acquainted with 75 cases which I have either seen personally or the histories of which I have studied. Of these 29 died, a mortality of 39 per cent. (Footnote 1). Complete postmortem examinations were made in 19 cases, of which 16 are reported in this paper. The kidney was removed in 2 additional cases. A preliminary account of this outbreak has already been reported by the writer.[1]

Epidemics have occurred in northern Africa and in South America. An outbreak early in 1917 of what was at first termed "a mysterious disease", but which was later recognized to be epidemic encephalitis, was described in Australia by Breinl.[2]

In whichever part of the world these outbreaks have occurred they have never assumed pandemic proportions, thus differing from the devastating influenza, and to a lesser extent from poliomyelitis. In England, for instance, less than 250 cases were reported in the first outbreak. And yet, one begins to wonder if these figures represent the true state of affairs. When a disease is first described only those cases are recognized which present the complete picture finished in every detail. As knowledge advances, we come to realize that there must inevitably be minor forms of the malady which elude the observation of any but the most penetrating and discerning eye. We no longer demand the full tale of classical signs to make a diagnosis of Grave's disease. Poliomyelitis does not inevitably necessitate

*From the Pathological Department, Winnipeg General Hospital.

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Footnote. 1.—There were in all 159 cases in Manitoba, 89 in Winnipeg, and 70 in the rest of the province.

the occurrence of complete paralysis and atrophy. The frequency and importance of "formes frustes" in poliomyelitis is now fully accepted. It is through the agency of these ambulant cases that the disease is carried and disseminated.

A study in retrospect of our experience in Winnipeg forces one to the conclusion that what is true for poliomyelitis is also true for epidemic encephalitis. Although the disease is most certainly infectious, it was impossible in the great majority of cases to trace the source of the infection, or to demonstrate any relation between the various cases as they appeared now here, now there. In a number of instances, a solitary case would occur in an isolated farmhouse away out on the prairie and the next case to appear would be in another farm 20 or 30 miles away. The only explanation of such a phenomenon would appear to be the conveyance of the infection by persons either apparently perfectly healthy or presenting none of the classical features of the disease. It may well be that susceptibility to the disease is the exception rather than the rule, that during an epidemic the infection is widely spread throughout the community, and that, when it reaches the susceptible individual, the infecting agent penetrates the central nervous system and gives rise to the familiar classical picture.

It is very rare for two cases to develop in one house. No such instances have occurred in our experience. In two cases, however, we have been able to trace the spread of the infection. Details of these will be given when the incubation period is discussed.

Symptoms.—The first cases which were described in the literature, presented a very definite symptom-complex which could be recognized at a glance. Our own experience was similar, so that the early cases were characterized by fever, lethargy or actual somnolence, involvement of the motor cranial nerves, especially those grouped around the aqueduct of Sylvius. Later, however, we came to realize that a case of epidemic encephalitis need not present any of the above characteristic triad. Cases that were diagnosed clinically as "cerebral hæmorrhage", "uræmia", and "tuberculous meningitis" (to mention the three most common mistakes) were found at autopsy to show the typical microscopic lesions of encephalitis. Further, a number of cases presenting transient cranial nerve palsies or slight degrees of lethargy are now recognized to have been most probably examples of encephalitis, although they were not diagnosed such at the time. Sabrazès and Massias[3] report two cases of this description in which there were fever and ocular symptoms for a few days, but the patients were not confined to bed.

The symptoms may be general or localizing. Every case presented the former, but the latter, although usually present, were sometimes completely absent. In such cases, with the knowledge at present at our disposal, it was not possible to arrive at a correct antemortem diagnosis, but the autopsy showed the true nature of the condition. In some cases, the localizing symptoms appeared a considerable time after those of a general or more indefinite character. Thus, the first evidence of anything being wrong with one patient was the onset of marked constipation with great abdominal distension. This persisted throughout the illness, and was the most marked feature of the case until its fatal termination. Not until a week later did the somnolence and cranial nerve disturbance develop which enabled a correct diagnosis to be made. Should these localizing signs not have developed, how would such a case have been regarded? If such cases are of frequent occurrence, it is evident how far out we may be in our estimates of the dimensions of an epidemic.

The *general symptoms* in our cases have been fever, lassitude, headache, pain in the back, conjunctivitis, furred tongue, constipation, and loss of appetite. In a number of cases, however, the appetite has been ravenous, during the febrile stage as well as in convalescence. Indeed, one nurse went so far as to say that a certain patient must have encephalitis because he was eating so much. In view of the general symptoms

we are, I think, justified in regarding the disease as a general infection which may or may not become localized in the brain, although the voracious appetite may conceivably be due to some local cerebral lesion. In which proportion of cases such localization may occur we cannot at present say. Such a conception would bring the disease in line with the current views regarding such conditions as poliomyelitis and cerebrospinal fever. The latter condition, especially, is regarded as a general infection with subsequent localization in the meninges, a conception which has had an important bearing on the treatment of the disease. In three cases, the autopsy showed numerous petechial haemorrhages under the epicardium, the pleura, and on the surface of the diaphragm, an indication of a general infection during at least one stage of the illness.

The *localizing symptoms* are disturbances of the cranial nerves and the development of a characteristic lethargy and somnolence.

The various features of the disease may now be studied a little more in detail.

Incubation Period.—The only observation bearing on the incubation period with which I am acquainted is that of Sabatini[4]. A man left Verona, where the disease was epidemic, and went to Calabria, where it had not yet arrived. Twenty days later he developed typical symptoms of the disease.

In three of our cases, for the details of which I am indebted to Dr. Gordon Bell, the incubation period appeared to be two weeks. The cases are as follows:

(1).—A man who lived in the country came in to Winnipeg, where he visited his brother's family and stayed for one day, returning home on the following day. Two weeks later both he and the niece in the house which he had visited developed lethargic encephalitis.

(2).—A rig-driver who lived in a small town where there was no encephalitis drove a doctor thirty miles into the country to see a case of the disease, and stayed for three hours in the house. Two weeks later he developed lethargic encephalitis.

(3).—A commerical traveller left Winnipeg during the epidemic and went to Chicago where, according to the Chicago Public Health Reports, there were no cases of the disease at the time. Returning to Winnipeg two weeks later he developed the disease on the train.

Onset.—The onset is very variable, depending probably upon how soon the central nervous system is invaded. As a rule, it is sudden, sometimes so sudden as to be misleading. Thus in one case the patient was in a store when he was suddenly overcome with weakness and would have fallen to the ground but for assistance. A child aged 18 months was taken down town by her mother, where she suddenly became so ill that she had to be taken at once to the hospital. A provisional diagnosis of intussusception was made, but the subsequent autopsy showed typical and severe lesions of encephalitis. In a few cases the onset has been so acute as to suggest a cerebral haemorrhage.

On the other hand it may be so gradual and insidious that a correct diagnosis cannot be made for some time. A woman complained of malaise, lassitude, and severe headache for three weeks. At the end of that time she developed internal strabismus from paralysis of the sixth nerve, and a diagnosis of cerebral tumor or cerebrospinal syphilis was made. Five days later, that is to say a month after the onset of symptoms, the picture changed, the sixth nerve paralysis disappeared, and its place was taken by double facial paralysis and a marked degree of somnolence.

Duration.—Equally varying is the duration of the illness. One of our cases died within 24 hours. In others the attack was so slight that convalescence set in within a week. As a rule the duration of the acute symptoms was several weeks, and convalescence was slow and tedious. One patient, an old man of 75, was taken ill at the beginning of November and remained in a condition of stupor until the end of the following March. He then appeared to awake as from a period of hibernation and wanted to know what month it was—a veritable Rip van Winkle.

Age.—Epidemic encephalitis is no respecter of age. Our youngest patient was aged 16 months, our oldest 75 years. As a rule, however, it attacked those in adult life between the ages of 20 and 40.

Fever.—The disease is a febrile one, and the degree of pyrexia bears some relation to the severity of the illness. For purposes of prognosis, however, too much stress must not be laid upon the temperature. In some cases where the localizing signs had disappeared and the patient was apparently making good progress towards recovery, the temperature remained elevated for a week or more. In a few cases, although the patient was getting worse, the temperature kept falling. Persistent pyrexia was of course of serious import. The pyrexia varied as a rule from 100° to 103.5°F. In one case the temperature went up to 107.4° F. some hours before death. In this case very marked lesions were found at autopsy. The fact that in some instances there appeared to be no definite relation between the temperature and the brain condition may be explained by recalling that the disease is not a purely cerebral infection.

Gastro-Intestinal Disturbances.—Evidence of disturbance of the alimentary canal was commonly met with, more severe in degree and longer in duration than could be accounted for by the fever. Reference has already been made to a case in which the first symptom of the disease was extreme and persistent constipation. This feature was present in quite a number of cases, usually in the early stages of the disease. In only one case was there diarrhoea. A heavily furred tongue was often observed, together with foul breath. Abdominal distension was noted in 4 cases. No distinctive lesions have been found in the alimentary canal at autopsy.

Urinary Disturbance.—In 8 cases there was albumin in the urine, moderate in amount, and usually present for only a few days. In two cases there were red blood-cells. Twice an incorrect diagnosis of uræmia was made, in both cases the true condition being revealed at autopsy.

Retention of urine has been a marked, though transient, symptom in a small number of cases, in one of which the bladder was distended up to the umbilicus.

Blood.—Leucocyte counts were made on all the cases which came into hospital, and the results varied in the same way as do all the other manifestations of this remarkable disease. A slight degree of leucocytosis of about 10,000 was the rule, but in quite a number of cases the count was perfectly normal, so that a low count in no way excludes a diagnosis of encephalitis. The highest figure obtained was 16,000. It was impossible to predict in which case a leucocytosis would be found, and the count appeared to bear no relation to the degree of fever. The differential count showed no abnormality.

Cerebrospinal Fluid.—The same remarks apply to the cerebrospinal fluid, except that a normal fluid was the rule rather than the exception. Although the composition of the fluid was normal in so many cases, the pressure was usually markedly increased, as was the amount of the fluid. A slight pleocytosis of from 20 to 30 was not uncommon, and in two cases the count was 154 and 210. The cells were almost all lymphocytes. A slight globulin reaction was obtained in a number of cases, but in no instance was this really marked. The Wassermann reaction was negative in all of the fluids examined.

L. F. Barker[5] in a comprehensive study of encephalitis lethargica found blood, which he did not regard as being accidental, in several cases. This has not been our experience in a single instance. Netter[6] reports an almost constant increase in the amount of sugar in 15 cases examined, unaccompanied by hyperglycaemia. This finding proved of diagnostic value in 4 of the cases. He regards the phenomenon as due to irritation of the glycogenic centre.

It appears probable that the condition of the fluid may vary from day to day. Barker and also Wegeforth and Ayer[7] found this to be so in several of their cases. I regret that consecutive examinations were not made in most of our cases, but in one there were 4 cells on one occasion and 38 three days later.

The condition of the fluid appeared to bear no relation to the severity of the illness. Both of the cases with a high cell count made a good recovery, and in most of the fatal cases the fluid was normal. Changes in the fluid are dependent upon the degree of meningitis. If the main lesions are deep-seated, as they usually are, in the basal ganglia and brain-stem, there would be no reason to expect changes in the spinal fluid.

Mental Condition.—The name of the disease implies that lethargy is one of the most characteristic symptoms. In many, indeed in the majority of cases, this is true. The lethargy varies greatly in degree. There may be only a certain amount of apathy and torpor, or the patient may be sunk in a state of stupor which no external stimuli can penetrate. As a rule, a sharp question will arouse him, but the flash and speed of the mind have gone, and in a few moments his thoughts are packed away on the dusty shelves of forgetfulness. The "great barons of the mind", to use Stevenson's phrase, "fail to rally to the standard, but sit each one at home, brooding on his own private thought."

At first sight it would appear that there is a paralysis of ideation, but it is more probable that the defect is on the sensory side. Severe and widespread lesions are present in the thalamus, which may well be responsible for blocking incoming stimuli from reaching the higher centers, so that the latter are in a condition of isolation.

It was soon recognized, however, that a patient may be suffering from epidemic encephalitis, even in a fatal form, and yet display no signs of lethargy. In a number of our cases instead of lethargy there was restlessness, excitement, and even maniacal symptoms. Nocturnal delirium was not uncommon, so that the patient might pass the day in sleep but be restless and delirious all night.

An example of a case with excitement is the following:

A man on getting up one morning began to pray. As this was far from usual with him, his wife feared that he must be ill. He continued at his prayers all morning, and then became both excited and violent. As he persisted in crawling under the bed he had to be strapped down to the mattress. During a period of several days he remained in an acutely maniacal condition, became gradually weaker, and died on his way to hospital. At no time was a suspicion of encephalitis lethargica entertained. The autopsy revealed multiple petechial haemorrhages in the floor of the fourth ventricle, and when the brain was studied histologically marked and characteristic lesions of encephalitis lethargica were found in the medulla, pons, and mid-brain.

Another patient displaying typical cranial nerve involvement was so excited and delirious that he had to be kept under sedatives for a number of weeks.

A third case with diplopia and tinnitus was sleepless, excited, and exalted during the early part of his illness, insisting on going to a dance on the third evening. By the fifth day he began to display symptoms of lethargy, and died a few days later.

Muscular Rigidity.—The more one sees of epidemic encephalitis, the more is one impressed with the importance of muscular rigidity. In typical cases the most characteristic feature is (Fig. I.) facial expression. It is fixed, mask-like, inscrutable as the sphinx. No light and shade of emotion play over the features. The whole appearance is strongly reminiscent of the Parkinsonian mask. The lines of the face appear to be ironed out, a condition which was at first attributed, wrongly I think, to bilateral paresis of the facial nuclei. Much of this lack of expression is due to rigidity of the facial muscles. There is difficulty in initiating a muscle movement, and when it has been made there is not the rapid return to the original state which is characteristic of health.

Several interesting examples of this long drawn-out muscular contraction have been pointed out to me by Dr. Charles Hunter. In one patient who was asked to whistle, the pouting of the lips continued a long time after the effort ceased. On showing the teeth



Fig. I. Marked degree of ptosis and slight weakness of the left facial nerve. The patient is trying to look at the camera.

the facial contraction only gradually passed off. The tongue when protruded was withdrawn very slowly. A smile faded slowly from off the face. In another case, it was remarked that the teeth were much better shown during laughing than by a voluntary effort, as if the emotional element was an aid to the muscular contraction. In a number of instances catatonia was well marked, so that when the hand was lifted into the air it was held there for some time and then slowly withdrawn in a way which at once recalled the behaviour in dementia praecox. In 4 cases even after the patients were able to be up they remained helpless when in bed because of the rigidity, requiring assistance in changing their position. As their helplessness was combined with marked restlessness, the nursing was as strenuous as in similar cases of paralysis agitans.

In some of the cases the facial and bodily rigidity was strongly suggestive of paralysis agitans. The most striking example was the following:

A girl, aged 21, nine days ago began to feel dull and noticed a buzzing noise in the left ear. She suffered from insomnia, and during the day was alternately restless and apathetic. There were no eye symptoms nor undue drowsiness. The temperature was normal. She presented a most striking picture of Parkinson's disease, sitting leaning forward in her chair, with her head stooping forward as if she had a stiff neck, and the blank, expressionless appearance of a mask. When she walked the gait was typical to a degree, shuffling, the back bent forward, the arms flexed at the elbow and the hands at the wrist, the rigid gaze fixed on the ground. There were irregular tremors of the arms and legs, the knee jerks were increased, but there was no involvement of the cranial nerves. Later she developed a considerable degree of drowsiness. Convalescence was slow, and even after she had regained her mental brightness her face retained its sphinx-like gravity for some time.

The analogy of Parkinson's disease suggests that the cause of the rigidity must probably be attributed to lesions in the corpus striatum and those groups of small cells in the globus pallidus which Ramsay Hunt has shown to be primarily involved in paralysis agitans. As no autopsies were performed on any of the cases showing marked rigidity we were unable to determine this point.

Tremors.—In a number of cases tremors of various descriptions were observed. These were sometimes fibrillary in character, recalling those of progressive muscular atrophy. In some cases, they were more rhythmic in character, affecting especially the hands and arms, and resembling the cigarette-rolling movements of paralysis agitans. In other instances they were much coarser, almost choreic in type. One patient, for instance, was unable to hold a cup of tea owing to the violent twitchings of the arms. In 4 cases most remarkable clonic contractions of the rectus abdominis were observed, suggesting a very severe attack of hiccough, a

subject which will be referred to again presently. The details of two of these cases are as follows:

Case I.—A man, 25 years of age, began to feel poorly two weeks ago, complaining of pain in the back of the neck and the left shoulder, malaise, loss of appetite, diplopia, and insomnia. On admission to the hospital he showed well marked bilateral ptosis, lay in bed in a muttering delirium, and displayed constant twitchings of the arms, legs, and abdomen. For a description of these tremors I am indebted to Dr. E. S. Moorhead. The contractions of the arms were not at all marked. When observed during sleep there were twitchings of the corners of the mouth and the brows contracted at intervals. Muscular contractions of the right leg were counted at 84 per minute, but only 48 in the left leg. Next day the right leg showed 55 per minute, the left 36.

The most remarkable clonic contractions, however, were those of the rectus abdominis. These were extremely violent, and were more marked on the right side than on the left, as could be demonstrated by placing a coin on each rectus and observing the amplitude of movement. The contractions were of two kinds, one slow, upwards, and to the right, the other a series of quick jerks upwards. Occasionally the right and left sides contracted alternately, but usually the contractions were synchronous. They varied on different days from 11 to 21 per minute. A couple of days later lateral nystagmus in both directions developed. As the patient improved the twitchings in the limbs disappeared, then those in the left rectus, and finally those in the right rectus.

Case 2. A man, aged 35, complained of severe pain in the back of the head. On admission to hospital two days later his face was flushed, he was very excited, rambling and delirious, and wanted to jump out of the window. A few days after admission curious twitchings of the muscles began to appear. There were fibrillary tremors in the arms and legs, and extraordinary clonic spasms of both recti many times per minute. These were quite as violent as in the preceding case, and came on suddenly and without the slightest warning. They continued for three weeks, during which the patient was at first excited, noisy and restless, but later became very drowsy and lethargic. The cerebrospinal fluid was normal, except for markedly increased pressure. He eventually made a good recovery.

It would be interesting to speculate on the site of the lesions responsible for these remarkable abdominal spasms, but unfortunately we have no postmortem evidence to submit. In all four of the cases there were symptoms suggestive of cortical irritation, but the signs of an upper neurone lesion such as exaggerated knee jerks and Babinski's sign were absent. In all of them, one of the early symptoms was pain in the back, so that it is possible that irritation of the dorsal spinal nerves may have been responsible.

Similar convulsive movements have been described by other writers in recent papers. Reilly[8] regards the contractions of the rectus as of diagnostic value, and observed it in a considerable proportion of his cases. Sicard and Kudelski[9] speak of a myoclonic acute encephalitis. Sabatini states that in many of the Italian cases rhythmic contractions of the muscles, especially the rectus abdominis, were amongst the earliest signs. He showed by means of the diascope that the diaphragm was not affected. In one of his cases the contractions were at first confined to the cremasters, but typical abdominal spasms set in later. Boveri[10] gives details of a couple of well-marked cases.

Hiccough.—In a study of the recent literature on epidemic encephalitis hiccough is mentioned as a symptom in a small number of cases. In our own experience it was observed a number of times, but was never so prominent as to constitute a marked feature of the clinical picture. During the month of November, 1919, however, that is to say a few days after the first cases of encephalitis had appeared in Winnipeg, there occurred a most remarkable epidemic of hiccough, not only in the city but in several of the neighboring towns. A very large number of cases occurred, but it is not possible to

give the exact or even the approximate figures, as the condition was naturally not notifiable. There must have been far more cases of hiccough than of encephalitis, for most of the practitioners had two or three cases, and some saw as many as fifteen or twenty. A number of doctors developed the condition, one of whom kept hiccoughing continuously at intervals of about a minute for five days, at the end of which time he was quite worn out for want of sleep. The duration was as a rule from 24 to 48 hours, but in some instances it lasted for four or five days. The condition yielded readily to a single injection of morphine.

What are we to say of this extraordinary occurrence? If the two epidemics bear no relation to each other, the coincidence is surely remarkable. The myoclonic contractions of the abdominal muscles observed in lethargic encephalitis and the contraction of the diaphragm in hiccough are of very similar nature. Can it be that the virus of the disease may spare the brain in mild cases and irritate the cervical origin of the phrenic nerve?

I have been able to find only one reference, and that a very recent one, to epidemic singultus in the literature. Gotti[11] records an outbreak of 7 cases of hiccough near Ravenna in Italy. It occurred at the same time as an epidemic of encephalitis, and he considers that the two outbreaks were related. The average duration was 3 or 4 days, but in a few cases it was as long as 7 or 8 days.

Sensory Symptoms.—Although the motor manifestations of epidemic encephalitis are the most striking, sensory disturbances are not lacking. Headache is a very constant symptom, and pain in the back is not infrequent. In addition to these, neuralgic pains have been observed in a number of cases. These were most marked, as a rule, in the shoulder and upper part of the arm, but the hands and even the legs may be affected, sometimes to such an extent as to cause confusion in the diagnosis.

A man, 34 years of age, complained of pain in the right hand, spreading up as far as the shoulder. It then appeared in the left arm, then the right leg, and finally the left leg. All four limbs were affected at the same time, and a diagnosis of peripheral neuritis was made. The muscular power was unimpared. Three weeks later marked weakness developed in both arms and legs, and at the same time fever, ptosis, and other cranial palsies made their appearance. The patient became very drowsy and slept for nearly a month. The illness was very long drawn-out, and five months later he was beginning slowly to recover.

Whether these neuralgic pains which have been observed in a number of our cases are central in origin, due to lesions in the thalamus, or whether they are due to irritation of the posterior nerve roots has not been determined. Bassoe[12] who describes a number of cases under the caption "The Meningoradicular Type of Epidemic Encephalitis", considers the latter explanation to be correct.

The following case, in which the pain was accompanied by an attack of herpes zoster, would appear to support this view.

A woman, 45 years of age, developed severe neuralgic pains of a root character on the left side. A couple of days later the characteristic lesions of herpes zoster appeared in the area of distribution of the pain. The herpes cleared up, but the pain continued, and 8 days later ptosis, tinnitus, drowsiness, and a characteristic facies proclaimed the disease to be epidemic encephalitis. The patient subsequently made a good recovery, but the pain persisted for some time.

Reflexes.—The condition of the reflexes was so inconstant as not to be found of any diagnostic value. When the diversity of the lesions comes to be considered it will be seen that no constant change could be expected. In some cases knee jerks were exaggerated, in others they were lost, but in many they were normal. The Babinski sign, either unilateral or bilateral, was present in a number of cases, not always associated with exaggerated knee jerks. A well-marked Babinski sign would sometimes be found to have vanished next day, thus corresponding with the fleeting character of some of the

other neurological disturbances. This phenomenon has an important bearing on the pathology of the disease, and will be referred to again later.

The organic reflexes were, as a rule, involved only when the patient was sinking into a condition of stupor. In a few cases, however, there appeared to be some interference with bladder function at an earlier date. Several patients had difficulty in passing water, and in two cases the bladder became greatly distended owing to acute retention. One patient, to be referred to again, did not regain full control over the sphincter even after recovery was supposed to have occurred.

Cranial Nerves.—Disturbance of the cranial nerves is the most characteristic sign of the disease. It is a localizing sign of such significance that when it appears doubt vanishes and a confident diagnosis can be made. It is necessary to complete the classical picture of the disease, but it must be remembered that it may be completely absent. It may appear at the very onset of the illness, or not until several weeks have elapsed. The early occurrence is common, the later rare.

The most remarkable feature of these disturbances is their transient and fleeting nature. Not only may they be here today and gone tomorrow, but they may vary from hour to hour. A patient may have marked diplopia when first examined, but six hours later his vision may be normal, and the same may be said of many of the other evidences of facial disorder. To suppose that manifestations so fleeting and evanescent could be due to lesions in the nuclei of the cranial nerves appears absurd. No nerve cells could recover so rapidly from serious trauma. It is much more probable that the cause is an inflammatory oedema dependent upon vascular disturbance, or, it may be merely a dilatation of a vessel, either of which may press upon neighboring nerve fibres so as to interfere with their function. The moment such pressure is removed the function returns.

The more enduring palsies, on the other hand, are associated with changes in the cranial nerve nuclei, as is shown in the examination of our pathological material. Even such changes, however, are not necessarily due to the action of a virus on the nerve cells, for they may be secondary to lesions of the axons proceeding from these cells.

2nd Nerve.—No cases of optic neuritis were observed, but two patients showed pronounced optic atrophy with marked failure of vision some months later.

3rd and 4th Nerves.—No nuclei are so frequently involved as those grouped around the aqueduct of Sylvius in the mid-brain, so that ptosis, diplopia, strabismus, interference with vision, and disturbance of accommodation were amongst the commonest symptoms. Diplopia was the most common single symptom observed during the epidemic, but it seldom lasted for more than a day or two. Ptosis was frequent, usually bilateral, but often more marked on one side (See Fig. I.). Paralysis of accommodation so that the patient was unable to read was noted in a number of cases. This symptom was less transient than many of the others, for in some instances it persisted during several weeks of the convalescent period. The pupil generally reacted sluggishly to light and accommodation. In a few cases the reaction to light was lost.

5th Nerve.—In only one of the cases could we convince ourselves that there was definite involvement of the 5th nerve. Barker observed tenderness over the masseter in three cases, but as his paper appeared when our epidemic was over this sign was not examined for.

6th Nerve.—Paralysis of the 6th nerve, when it did occur, was often peculiarly fleeting in character, due, we venture to believe, not to any nuclear lesion, but to involvement of the nerve fibres in their long course through the pons. In several cases we were able to demonstrate a greatly dilated and inflamed vessel lying between the fasciculi of the nerve. It is a curious experience to see a patient with complete paralysis of the nerve and internal strabismus one day, and not a vestige of weakness on the next.

7th Nerve.—Some degree of facial weakness, often manifested only by a slight flat-

tening of the nasolabial fold, was common. Sometimes this was unilateral, sometimes bilateral. For some unexplained reason this weakness was in some cases confined to the lower part of the face, whereas in a nuclear or infranuclear lesion one would have expected involvement of the whole face. In one instance an incorrect diagnosis of Bell's paralysis was made, although the possibility of a cerebello-pontine angle tumour was entertained. The patient suffered from pain in the occipital region, vomiting and noises in the left ear. Complete facial paralysis on the left side soon developed. There was no elevation of temperature, and, although the patient was rather dull and stated that he had seen double at the beginning of his illness, the real condition was not suspected until he became profoundly lethargic and sleepy. In one case, already referred to, there was complete bilateral facial paralysis, giving the patient a very remarkable appearance, especially when she tried to use her facial muscles.

8th Nerve.—Tinnitus occurred so frequently early in the illness that it came to be regarded as a symptom of great diagnostic importance.

9th and 10th Nerves.—Difficulty in swallowing was noted in 4 cases. In one of these the dysphagia became extreme, and the patient died after an illness of little more than a month. Unfortunately an autopsy was not obtained.

11th Nerve.—No disturbance was noted.

12th Nerve.—Tremors of the tongue were present in a number of cases, and in one case the tongue was deviated definitely to one side.

Prognosis.—The mortality from epidemic encephalitis has varied considerably in the different outbreaks which have been reported. Perhaps it would be better to say that there has been considerable variation in the reported mortality. Such statistics have to be based on the total number of cases, and it is extremely probable that this number has been much underestimated. The disease is so protean in its manifestations that many cases must have gone unrecognized.

In our own experience only the typical cases were recognized at the beginning of the outbreak, but soon it became evident that a number of cases which were classed as cerebral haemorrhage, tuberculous meningitis and other conditions were in reality examples of encephalitis. A gross examination of the brain is not sufficient. Farquhar Buzzard[13] has emphasized the point that what may appear to be a typical case of cerebral haemorrhage may on microscopical investigation prove to be one of encephalitis, and this has been confirmed in at least one of our cases. On the other hand, there have been many cases presenting a moderate degree of fever and transient diplopia, squint, or facial paralysis, the whole clearing up in the course of a few days, which should probably really be regarded as mild forms of the disease. It is unfortunate that there is no laboratory test which might enable one to arrive at a correct conclusion in such cases.

In the English epidemic the mortality was somewhat over 20 per cent. Netter reported 7 deaths in 15 cases, and v. Economo 5 out of 11 in the original outbreak in Vienna. In Winnipeg there were 29 deaths out of 75 undoubted cases, a mortality of 39 per cent.

Sequelæ.—The question of the occurrence of sequelæ is of the greatest importance. Sufficient time has not elapsed in our own experience to make any pronouncement of value. Further, it is somewhat difficult to separate sequelæ from long-continued manifestations of the disease. It may be said, however, that many of the patients have not returned to a normal state of health for a long time. Patients who were taken ill at the beginning of November, 1919, still complain at the time of writing (May, 1920) of asthenia, lack of energy and initiative, occipital headache, and other minor disabilities.

One patient developed a very itchy erythematous rash on the neck, arms and body 2 weeks after leaving hospital. His subsequent progress was very slow, and it was only after 5 months that he began to regain strength. He is still very thin and suffers from occipital headache.

A girl, 6 years of age, was discharged from

hospital on January 18th as improved, after an illness of 2 weeks. At the end of April her parents reported that her whole disposition had changed, that whereas previously she was an animated, playful child, she has now lost all her former spirits, no longer laughs, and sits for hours silent in her chair. There is occasional loss of control of the urinary sphincter, especially in bed at night, but this occurred twice when she was at a cinema show. There is apparently slight weakness on one side of the face.

In two cases choreiform movements persisted for several weeks after the patient had otherwise recovered. In one of these they cleared up in little over a month, but in the other they were still present 5 months later.

One patient seen by Dr. Mathers 2 months after a mild but typical attack, complained of marked dimness of vision, and was found to be unable to distinguish colors at 2 feet. On examination of the fundus a marked secondary optic atrophy was discovered.

In another case seen 6 months after the onset of the illness the ophthalmologist's report was as follows: "On the right side the pupil is widely dilated, with complete loss of reaction to light. There is a marked degree of optic atrophy. The retina around the disc shows considerable degeneration. Evidently a low-grade inflammatory condition. In the left eye the pupil reacts very slightly to light. There is commencing optic atrophy. The retina around the disc shows the same condition of progressive low-grade chronic inflammation as is seen on the right side. One patch about 1 mm. in diameter just below the disc shows complete degeneration, but the retina all round the disc is partially degenerated and grayish in appearance."

Weakness of accommodation has been present in a few cases several months after the original illness, and one patient had marked diplopia 5 months later.

Two cases developed symptoms of mental disturbance, of which delusions were the most prominent feature.

The rigidity has persisted for a remarkable time in a few cases. One girl who presented marked symptoms of paralysis agitans during the illness still had a striking Parkinsonian facies 5 months later, although she was perfectly bright mentally. A man seen 6 months after discharge from hospital had apparently made no progress in that period. Sitting leaning forward in his chair with a blank expressionless face

"He listened not except I spoke to him,
But folded his two hands and let them talk,
Watching the flies that buzzed."

He walked with the shuffling gait and forward stoop of Parkinson's disease.

The most striking examples of sequelæ are contained in the reports of European observers. Farquhar Buzzard has described a long series of such cases. Rythmic movements of choreiform or athetoid type were common, coming on weeks or months after the original illness. The arms and shoulders were especially affected, but in one case the movements began in the great toe, spreading upwards till the whole leg was involved. One lady aptly nicknamed these movements her "joggles".

Von Economo[14] reports the case of a man who was taken ill in April, 1917. His recovery was followed by several severe attacks separated by periods of remission, the final clinical diagnosis being pseudo-bulbar paralysis with athetosis following lethargic encephalitis. He died on January 7th, 1919, and the brain showed extensive evidence of encephalitis, recent acute lesions as well as old ones being present.

The following case is remarkable for its long duration, and for the tremors which subsequently developed and which may be regarded as sequelæ.

W. R., aged 25, was admitted to hospital on January 6th, 1920, in a dull and apathetic condition. The temperature was 102° F. He lay stupidly in bed, staring at the ceiling in a dull, expressionless fashion. The cerebrospinal fluid was under high pressure, 80 c.c. being withdrawn. The cells and globulin were normal. He soon lost the power of speech, there being apparently actual difficulty in articulation. He became extremely emaciated, although his

appetite was ravenous. He suffered from extreme thirst, and passed large quantities of urine, as much as 130 ounces being collected in 24 hours. Every few days the temperature would go up to about 103° F. and then return to normal. Towards the middle of March, tremors began to appear. These were most marked on both sides of the face and about the mouth, and also in the hands and arms. The abdominal muscles were not affected, but the left leg showed slight tremors. The corners of the mouth were retracted about 75 times per minute. The twitchings of the hands were rhythmic, but faster on the left than on the right. On one day those on the left side were 240, on another, 188 per minute. The thumb and fingers of the left hand showed typical cigarette-rolling movements. There were periods of complete rest. The face was frequently bathed in perspiration, so that the drops rolled down the cheeks, a feature which has been present throughout the illness. The rest of the body was free from perspiration. In April the patient began to awaken out of his stupor, but the muscular contractions showed no abatement.

The cause of the muscular sequelæ is, of course, the lesions left in the brain by the acute attack. To anyone who has examined the histological appearances of the brain in epidemic encephalitis the occurrence of after effects comes as no surprise. Indeed the wonder is that they are not more frequent. There cannot be haemorrhages scattered throughout the brain without the formation of scar tissue, and it appears not improbable that disturbances similar to those of multiple sclerosis may make their appearance years afterwards.

Definite paralyses are not at all frequent, in marked contradistinction to poliomyelitis. The explanation for this appears to be that the brunt of the attack, as will be shown when the morbid anatomy is considered, falls not on the cells of the cranial nuclei and cerebral cortex but on the interstitial tissue of the brain-stem, interfering with conduction along the nerve paths, and giving rise to subsequent scar formation which is irritative rather than paralytic in its effects. In a fatal case which Greenfield[13] examined 4 months after the acute attack there was marked calcification in the walls of many of the blood-vessels.

Treatment.—No treatment produced the slightest effect on the course of the illness. Salvarsan was tried in one or two cases, but did harm rather than good. The administration of urotropine cannot possibly be of any benefit. Netter[15] has recently obtained some remarkable results by the injection of one or two cubic centimeters of turpentine into the thigh, thus producing a fixation abscess. Of 19 severe cases treated by this method with the formation of an abscess only 2 died, whereas of 25 similar cases not so treated 13 died.

PART II

PATHOLOGICAL FINDINGS

In the recent literature on lethargic encephalitis there are numerous accounts of the histological conditions found in the brain. No systematic attempt, however, appears to have been made to correlate the clinical with the pathological findings: to determine, for instance, the condition of the nucleus of the 7th nerve in a case manifesting facial paralysis.

This task has been attempted in the present investigation, but there have been many difficulties in the way. In some of the fatal cases which showed marked focal symptoms we were unable to get permission for an autopsy, whilst in other cases in which there were marked focal lesions in the brain the history was so defective as to be of little value. In the earlier cases a complete and systematic examination of the brain was not made. In the later cases, however, sections were made of the cerebral and cerebellar cortex, the optic thalamus, the superior and inferior colliculus, the pons at the level of the 6th nucleus, the medulla at the level of the 12th nucleus, and the upper end of the cord. The brain was examined histologically in 16

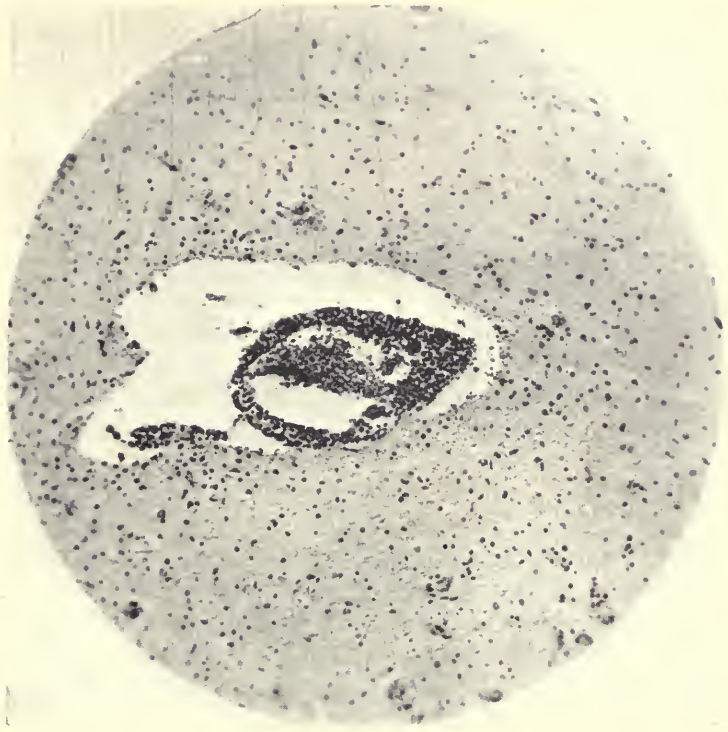


Fig. II. Vessel in mid-brain, showing collar of inflammatory cells. (Low power).

cases, and permission to remove the kidney was obtained in 2 additional cases.

The most marked lesions were naturally found in the central nervous system, but the kidneys also showed changes which are of interest and importance in that they indicate a widespread distribution of the virus.

In three cases numerous petechial haemorrhages were scattered over the pleura, the epicardium, the peritoneum and the surface of the diaphragm, the appearance resembling that found in septicaemia, and suggesting the action of a general irritant on the vessel walls. In two other cases small haemorrhages were observed under the endocardium.

The *changes in the brain* may be classed as *parenchymatous* and *interstitial,* the latter being much the more constant and characteristic. Indeed, the condition may be described as an interstitial inflammation which may or may not be accompanied by degenerative changes in the ganglion cells.

The vascular changes were the most striking. The vessels of the meninges were congested, and in some cases showed perivascular infiltration. In only two cases was a distinct condition of meningitis present, characterized by the presence of fibrin and polymorphs.

In every case there was great congestion of the brain substance, sometimes general, sometimes mainly confined to one region. The brain-stem was the part most commonly affected, but in some cases, especially those in which cortical symptoms predominated, the congestion in the cerebral cortex was marked. Small haemorrhages were of frequent occurrence, most common, perhaps, under the floor of the 4th ventricle. In Case 10, (*vidi infra*), which was mistaken clinically for cerebral haemorrhage, there were numerous large haemorrhages scattered throughout both hemispheres with remarkably little perivascular infiltration, a condition suggesting the action of a particularly acute irritant upon the vessel walls.

A very characteristic feature was the presence of a perivascular infiltration of inflammatory cells of the mononuclear series, form-

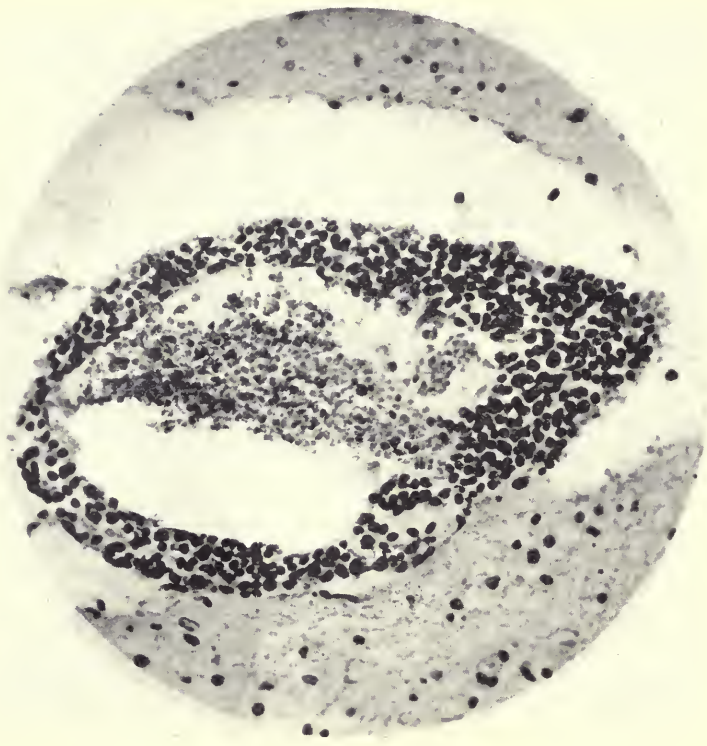


Fig. III. The same vessel as shown in Fig. II, more highly magnified. (High power).

ing a collar or cuff around the vessel. These cells were confined mainly to the Virchow-Robin adventitial space. In some cases, in which the vessel had become widely separated from the surrounding brain substance, the manner in which the collar of cells was confined to the vessel wall could be strikingly seen. In other cases, however, the perivascular space of His was invaded, the cells penetrating into the surrounding substance for some distance. The cells were of two main types, lymphocytes with darkly staining nucleus and scanty cytoplasm, and plasma-cells, larger, with eccentric nucleus showing marked clock-face arrangement of the chromatin granules and abundant cytoplasm, the outline of the cells being either round or polygonal. Elongated cells were sometimes seen, either fibroblasts or cells of the vascular endothelium which was in many cases markedly swollen. In only one case were polymorphs present. The collars were most numerous in the basal ganglia, the mid-brain, pons, and medulla, being rarely seen in the cerebral cortex and never in the cerebellum. The vascular changes in general were quite as marked in the white as in the grey matter.

In some cases there was an infiltration, sometimes diffuse, sometimes localized, of the brain with inflammatory cells, without any apparent relation to a vessel. This change was most frequently noted in the peri-aqueductal region of the mid-brain. Ependymitis, either of the aqueduct or the floor of the 4th ventricle, was noted in a number of cases.

In Case 4 there were numerous spherical, homogeneous, hyaline bodies, some of which showed concentric striation and resembled the corpora amylacea found in the prostate and elsewhere. As the patient was 60 years of age it was at first supposed that these were merely the amyloid bodies found in elderly persons in the region of the aqueduct and under the floor of the ventricles, considered by Nissl to be the results of degeneration of the ependymal cells. Similar bodies, how-

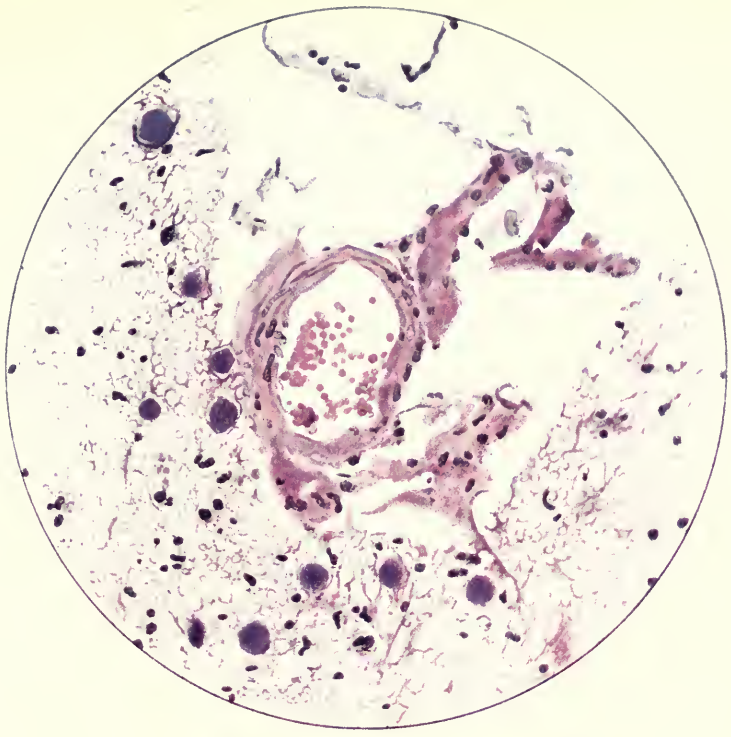


PLATE A
Hyalin bodies in cerebral cortex. (High power).

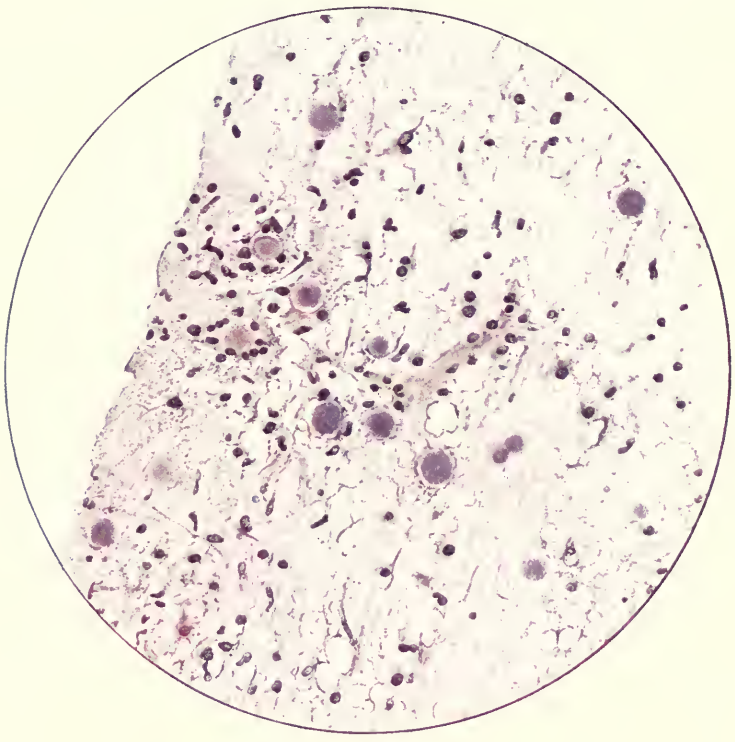


PLATE B
Hyalin bodies in mid-brain. (High power).

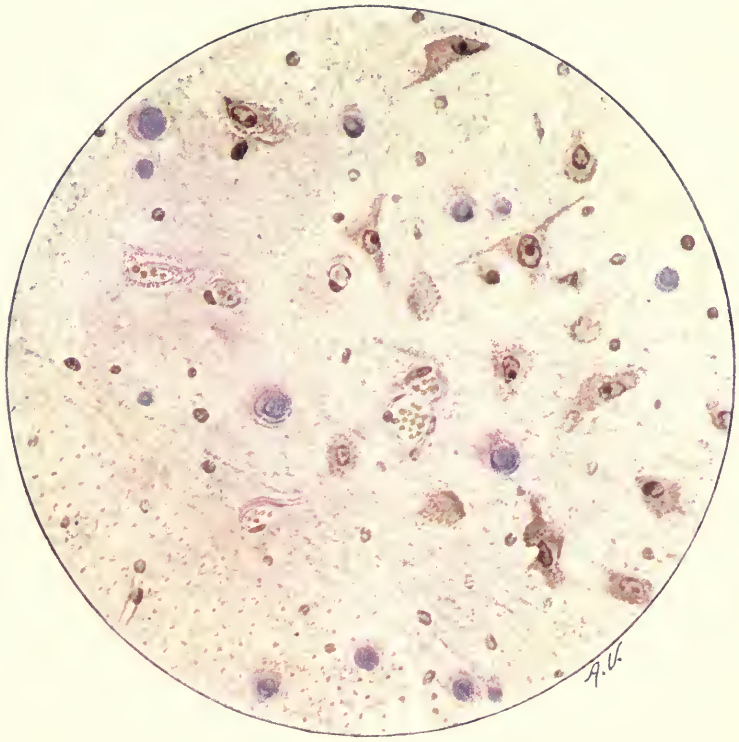


PLATE C.

Hyalin bodies in nucleus of seventh nerve. Van Gieson's stain. (High power).

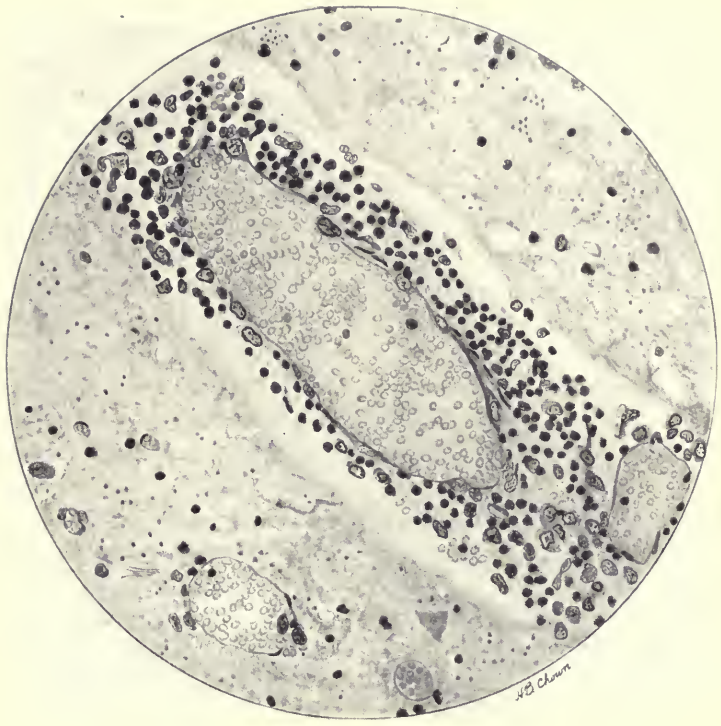


Fig. IV. A characteristic example of perivascular infiltration. The dilated vessel, the endothelium of which is unduly prominent, is surrounded by a collar of small lymphocytes with dark nucleus, and of larger plasma-cells with pale vesicular nucleus. Hemorrhage is also present. (High power).

ever, were found, although in smaller numbers in 6 other cases, none of whom were old, one being a girl of twenty-three. Moreover, they were by no means confined to regions of ependymal lining.

The bodies were as a rule of uniform size, but in some cases were of differing diameter. They presented a darker centre but no nucleus. In Case 4 they were present in the cerebral cortex, basal ganglia, mid-brain, pons, medulla, and cord, but not in the cerebellum. In other cases they were more limited in distribution. They were most numerous at the surface, around the aqueduct, and under the floor of the 4th ventricle, but they were found in every part of the white and grey matter of the brain and in the posterior columns of the cord. Although they were present in the nuclei of several of the cranial nerves, they could not be considered as products of degeneration of nerve cells, for they were even more numerous in the white matter.

The bodies stain dark blue with thionin, a paler blue with haematoxylin, bluey-black with iodine, and not at all with Van Gieson. A section stained with Van Gieson and counterstained with haemetoxylin shows in a beautiful manner the contrast between the nerve-cells and the hyaline bodies.

As to the nature of these structures there can be little doubt that they are products of degeneration, similar to the amyloid bodies found in old age. On account of the number of cases in which they occurred one appears justified in assuming that they were produced as a result of the inflammatory conditions. From what structures the bodies are derived is by no means clear. It cannot be the ependymal cells owing to the wide distribution. Hamilton[16] in his text-book figures large numbers of colloid bodies oc-

curring in inflammatory conditions of the brain, and states that these are formed as the result of swelling and degeneration of the axis cylinders. In our own cases the bodies appear to represent the products of neuroglial degeneration.

Bassoe and Hassin[17] describe spherical bodies occurring in the cord but not the brain of a case of lethargic encephalitis. These, however, appeared red in haematoxylin and eosin preparations, and did not stain with thionin. Henrietta Calhoun[18] found blue-staining homogenous bodies in the brain of one case, but the bodies were smaller and were entirely confined to the walls of the blood-vessels.

The parenchymatous changes were much less constant than the interstitial ones. In some cases the ganglion-cells were absolutely normal; in others, they showed profound degeneration and even disintegration. Lesser changes were common, such as loss of the Nissl substance, pigmentation, and eccentricity of the nucleus. These changes were occasionally present in the cortex, but were much more frequent in the nuclei of the cranial nerves, especially in the 3rd, 4th, 6th, and 7th. In the cerebellum degenerative changes in the cells of Purkinje were present in most of the cases, changes which were sometimes so profound that a mere ghost of the cell was left. Such profoundly degenerated cells might be flanked on either side by cells which were apparently normal. Marinesco[19] lays emphasis on the frequency of these degenerative changes in the cells of Purkinje. Throughout the brain the degree of degeneration bore little or no relation to the presence of inflammatory lesions in the neighborhood. In some cases the cells would show marked changes although there was complete absence of congestion, whilst in others there were haemorrhages in the center of a nucleus such as the 6th, and yet the cells appeared perfectly normal.

Reasoning from this and also from the remarkably fleeting nature of some of the focal disturbances, it is difficult to believe that the real force of the attack is spent upon the nerve-cells or that the cranial nerve disturbances are due essentialy to the action of the virus on these cells. In poliomyelitis the cellular degeneration is much more marked, and the resulting palsies are more or less permanent. It is difficult to see how in lethargic encephalitis a Babinski sign or a 6th nerve palsy which may be present for only one day could be due to destructive lesions in the nerve-centers. It is much more probable that a temporary vascular dilatation or oedema involving the nerve tracts is responsible for these phenomena. In many of our sections we have found greatly dilated vessels surrounded by an inflammatory collar either lying alongside or actually interrupting the fibres of such a nerve as the 3rd, 6th or 7th. In one such case facial paralysis on the same side was present, and it is probable that if serial sections of all the brains had been cut many other examples would have been found. The changes in the nerve-cells in most cases were of the type known as the axonal reaction, due to interference with the axon proceeding from the cell, and therefore secondary in nature.

Several writers have described neuronophagia as of frequent occurrence and characteristic of the disease. In only two of our cases could this be made out with certainty; in these cases some of the cells of the 3rd nucleus were surrounded by satellite cells which in some instances appeared to be actually invading the vanishing cell-body. In this regard our observations correspond with those of Marinesco, who in a very complete histological survey seldom found neuronophagia.

Discussion of the morbid anatomy of epidemic encephalitis has been confined hitherto to the condition of the brain. But it is well to look wider afield for changes in a disease which is probably a general intoxication with special localization in the central nervous system. The gastro-intestinal and urinary symptoms suggest such a general infection. So does the occurrence of rashes which have been described by some writers. In our series the kidneys were examined in 14 cases, and changes of considerable interest were found in many of them. Great caution must,

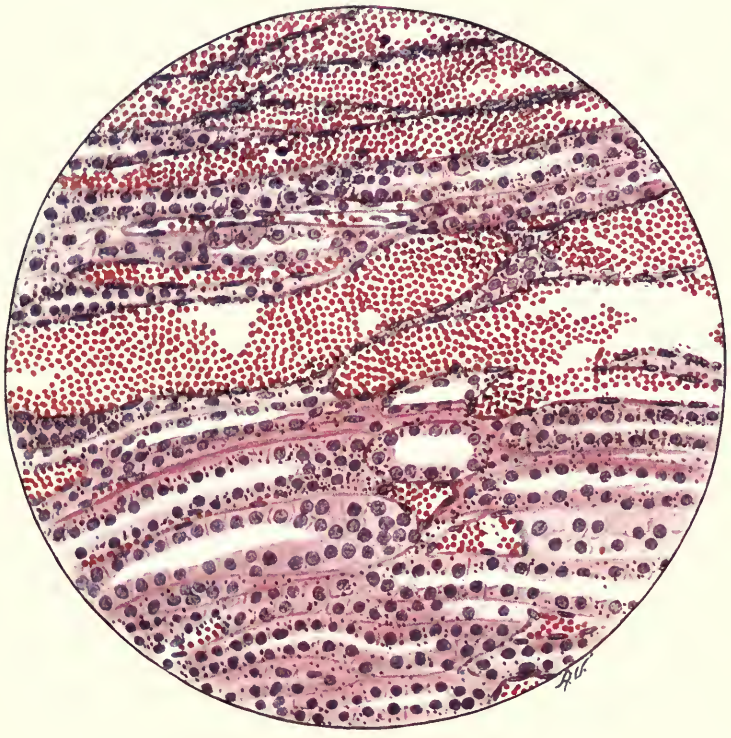


PLATE D.

Kidney, showing extreme congestion of medulla, with pigment granules in the cells of some of the tubules, while others remain free. (High power).

of course, be exercised in drawing conclusions from changes found in the kidney, since parenchymatous degeneration may accompany any febrile disease, or may be post-mortem in origin. At the same time the changes in some of our cases were so marked and so constant as to warrant the opinion that they are of real pathological significance.

None of the kidneys were quite normal. Cloudy swelling of the convoluted tubules was constant, and in two cases the cells were so profoundly necrosed as to suggest the action of some acute irritant such as corrosive sublimate. Both limbs of Henle were also affected, but the collecting tubules were normal.

The most striking feature, however, was the marked degree of hyperaemia. This was not so noticeable in the glomeruli, but the intertubular plexus and the straight vessels in the medulla were in many cases enormously dilated. Some of these vessels were thrombosed. A few cases showed haemorrhages in the medulla, varying in size. In the neighborhood of these haemorrhages were numerous granules of yellow pigment, mostly contained in the cells lining the Henle tubules.

In two cases there were focal collections of small round cells in that part of the boundary zone which was most congested.

The lesions, therefore, were mainly vascular and interstitial, with degenerative changes in the more highly specialized parenchymatous cells.

PART III

CASE REPORTS WITH AUTOPSIES

CASE 1. *Clinical.*—A man, aged 35, seen on Nov. 6th, 1919. On Nov. 2nd he awoke with an intense headache and found that he was unable to read. Next day he was lethargic during the day, but very restless at night. On Nov. 4th there was buzzing in the left ear, severe pain in the right arm between the elbow and shoulder, and marked insomnia. Tremors developed in both arms, so that he was unable to hold a cup of tea. On Nov. 6th the pain and the tinnitus disappeared. The pupils were equal but markedly contracted, and did not respond to light. No ptosis. Temperature 102° F. Cerebrospinal fluid showed an increase in globulin and 205 cells; the pressure was normal. There was a small amount of albumin in the urine, and granular and hyaline casts. The provisional diagnosis was uraemia. The patient became delirious, sank into a state of stupor, and died on Nov. 8th.

Pathological.—Marked congestion of the meninges both at vertex and base with web-like thickening of the pia over the pons. On the right side of the floor of the 4th ventricle there was a petechial haemorrhage. On section the brain showed considerable congestion, most marked in mid-brain and pons.

Microscopical examination shows that many cells of the 3rd nucleus are somewhat degenerated, the 5th, 6th, 7th, and 12th nuclei are normal, but the 10th nucleus shows profound changes, most of the cells showing chromatolysis and pigmentation, some being swollen, a few are mere ghosts. It is worthy of note that in the middle of the 12th nucleus there are several large haemorrhages on both sides, although the cells are quite normal, whereas in the degenerated 10th nucleus there is no special congestion.

A feature of all the sections are the numerous dilated vessels with marked collars. In the mid-brain there are several collections of inflammatory cells in the white matter, and numerous plasma cells can be seen between the strands of the 3rd nerves.

In the mid-brain, pons, and medulla there were found a few of the curious hyaline bodies which are described fully in Case 4, and which were present in varying numbers in several of the other cases.

Comment.—A case with marked degeneration of the 10th nucleus and the presence of hyaline bodies throughout the brain stem. No relation between the degree of vascular reaction and nerve cell degeneration.

CASE 2.—*Clinical.*—A young woman, aged 23, was seized on Nov. 4th, 1919, with headache, nausea and vomiting, and complained

of great dizziness. Two days later the vomiting stopped, the patient became dull and stuporose, and sank into a condition of coma. The temperature was 103° F., the leucocytes were 11,000, and the cerebrospinal fluid showed an increase in globulin and contained 210 cells per c.mm., all of them lymphocytes. There were no focal symptoms, and the clinical diagnosis was tuberculous meningitis. The coma deepened rapidly, and the patient died on the fifth day of the illness.

Pathological.—At the autopsy there was extreme congestion of the meningeal vessels over the entire brain, but no sign of meningitis. The cerebral cortex and the mid-brain were hyperaemic, and there were a number of small haemorrhages in the floor of the 4th ventricle.

Sections were taken through the cerebral cortex, mid-brain, pons, and medulla, but without special reference to the cranial nuclei. In every part except the cortex, there is great vascular engorgement with an extreme degree of perivascular infiltration. Several large haemorrhages are present lateral to the 3rd nucleus on the right side. One of these is in relation to an inflamed vessel, but the others show no such relation. There is a marked diffuse inflammatory infiltration in the peri-aqueductal region, being most marked in the 3rd nucleus on both sides. The cells of the nucleus show chromotalysis and other signs of a slight degree of degeneration. A few hyaline bodies are present in the thalamus.

Comment.—A rapidly fatal case with marked vascular reaction, and diffuse infiltration, but comparatively slight changes in the nerve-cells. Hyaline bodies in the thalamus.

Case 3.—*Clinical.*—The details of this case have already been given. The patient suffered from maniacal excitement for over a week, showed no evidence of lethargy, and died on the way to the Psychopathic Department.

Pathological.—At autopsy the meninges were markedly congested, and in the floor of the 4th ventricle there were half a dozen small haemorrhages. As the case had not been diagnosed as one of encephalitis, only the brain stem was kept.

The mid-brain shows slight congestion, but no perivascular infiltration or haemorrhages. Most of the cells of the 3rd nucleus are normal, but a few show some degree of degeneration.

In the pons and medulla the picture is very different. The vessels are extremely dilated, and there are many small haemorrhages here and there. Lying alongside and completely interrupting the strands of the 12th nerve on the left side there is a large dilated and thrombosed vessel surrounded by haemorrhage. Perivascular infiltration is very slight.

Many of the cells of the 6th nucleus are profoundly disintegrated, and in the 7th nucleus a few cells show marked chromatolysis. The other nuclei appear normal, except that some of the cells of the 12th nucleus of the left side contain a considerable amount of pigment, are somewhat swollen, and show slight chromatolysis.

Comment.—The pathological diagnosis was made from the extreme congestion and numerous haemorrhages. Perivascular infiltration was very slight. The interruption of the fibres of the 12th nerve corresponds with the secondary degenerative changes observed in the cells of the 12th nucleus. The lesions were very much more pronounced in the medulla than in the mid-brain.

Case 4.—*Clinical.*—A woman, 60 years of age, first seen on Dec. 1st, 1919. The history is vague and unsatisfactory, but apparently for some time she had been suffering from pains in the back and both legs, thought to be neuritis. On admission to hospital she was very drowsy by day, but restless and excited at night. There was marked ptosis and external strabismus, the pupils did not react to light or accommodation, the knee jerks were absent, there was bilateral facial weakness, and considerable rigidity of the neck. The temperature was 101° F., leucocytes 11,000, and the cerebrospinal fluid under pressure but otherwise normal. During

the next two weeks she remained in much the same condition, but on Dec. 17th there was a Babinski sign on the left side. She sank into a state of coma, and died on Dec. 20th.

Pathological.—At the autopsy there was marked congestion of the meningeal vessels, and a small sub-pial haemorrhage in the middle of the fissure of Rolando on the left side. On section small haemorrhages could be seen in the posterior part of the posterior limb of the internal capsule. The entire brain was greatly congested.

Microscopical examination revealed a very interesting condition. In every part of the brain there is extreme congestion, with thrombosed vessels and numerous haemorrhages. Perivascular infiltration, however, is so slight that only in one or two sections can distinct collars be seen. The meninges both of the brain and cord show extreme congestion, and between the vessels there is an exudate consisting of fibrin, plasma cells, lymphocytes, and large phagocytic mononuclears with numerous cell inclusions.

In every section examined the same remarkable hyaline bodies were encountered which have already been mentioned in connection with Cases 2 and 3. These bodies are homogeneous, spherical, several times the diameter of a red blood-corpuscle, and show a more darkly staining centre but nothing resembling a nucleus. In some a concentric structure can be detected, recalling the appearance of the corpora amylacea in the prostate and other organs. They are most numerous around the aqueduct, at the edge of the section, and beneath the floor of the 4th ventricle, but they are not confined to any one area. They are abundant in the cord, especially in the posterior columns. They bear no relation either to blood-vessels or ganglion-cells, although several were found in the neighbourhood of the inflamed vessels in the meninges, and also in the 7th, 10th and 12th nuclei on both sides. They stain blue with thionin and haematoxylin, bluey-black with iodine, but not at all with Van Gieson's stain.

Most of the cells of the 3rd nucleus are swollen and pigmented, and a few are profoundly degenerated. There is considerable degeneration of the 7th nucleus on both sides but the other nuclei appear normal.

In the cerebral cortex there is only a slight degree of congestion, the nerve cells appear quite healthy, and throughout the sub-pial layer there are numerous hyaline bodies, which, however, are not entirely confined to this layer. In the cerebellum a few of the cells of Purkinje are degenerated, but no hyaline bodies can be found. In the cord the meningeal vessels show marked perivascular infiltration, hyaline bodies are numerous, the cells lining the central canal are proliferating, but the anterior horn-cells are normal.

Comment.—The case is remarkable for the degree of meningeal reaction, and for the presence of very numerous peculiar hyaline bodies, probably the result of neurogliar degeneration. The lesions in the 3rd and 7th nuclei correspond exactly with the clinical symptoms.

Case 5.—*Clinical.*—A woman, aged 42, first seen on Nov. 8th, 1919. She had been ill for a week, suffering from headache, diplopia, ptosis, and strabismus. When seen she was in a comatose condition, and died shortly afterwards.

Pathological.—The most striking feature of the autopsy was the presence of numerous petechial haemorrhages in the pericardium, pleura, and peritoneum. They were especially numerous over the surface of the diaphragm. The meningeal vessels showed the usual congestion.

Microscopical examination shows an extreme degree of congestion in the mid-brain, pons, and basal ganglia, but much slighter in degree in the cerebrum and medulla. Many of the vessels are thrombosed. Some of the thrombosed vessels are surrounded by phagocytic cells loaded with yellow pigment. Perivascular infiltration is extremely marked, and there is great proliferation of the endothelial cells lining the vessels. Hyaline bodies are present in small numbers in the mid-brain, pons, medulla and cerebellum, but not in the cerebrum or basal ganglia.

A few cells of the 3rd nucleus show slight degenerative changes, but in no instance are these marked. There are marked inflammatory changes, however, along the course of the 3rd nerve on both sides, the fasciculi are separated by dilated vessels surrounded by deep collars, and many plasma cells can be seen between the individual nerve fibres. Throughout the mid-brain there is considerable diffuse infiltration with inflammatory cells, most marked in the substantia nigra. Cells of the other cranial nuclei are normal.

Comment.—Disturbance of the 3rd nerve was the most prominent clinical feature of the case. The fibres of the 3rd nerve were markedly interfered with, whilst the cells of the nucleus were almost normal, bearing out what has already been said in this connection.

Case 6.—*Clinical.*—A girl, 7 years of age, admitted to hospital on Nov. 12th, 1919. On the previous day she was suddenly taken ill with vomiting, convulsions, headache, dimness of vision, and ringing in the ears. On admission there was marked dimness of vision, coarse tremors in both arms, albumin and red cells in the urine, but no drowsiness. Temperature was 102° F. During the next 24 hours she had several attacks of Jacksonian epilepsy, with convulsive movements of the right arm and leg. Towards the end of the seizure the spasms passed to the left leg. During the attack she remained quite conscious. She died early on the morning of Nov. 13th, the provisional diagnosis being uraemia.

Pathological.—At the autopsy there was seen to be marked flattening of the cerebral convolutions in the frontal region on the left side, with obliteration of the sulci. There was marked congestion throughout the cerebrum, basal ganglia, and brain-stem.

Microscopical examination confirms impression of widespread congestion. This is most marked in the mid-brain, where many of the vessels are thrombosed and there are numerous small haemorrhages. In no part of the brain, however, can any perivascular infiltration be found. The fibres of the 12th nerve on the left side are lifted up by a large thrombosed vessel over which they pass. These fibres can be traced back to nerve-cells which show signs of degeneration, such as eccentricity of the nucleus and slight chromatolysis. The cells of the 3rd nucleus show similar slight changes. The cells of the cerebral cortex do not show any special change.

Comment.—Some doubt may be entertained as to the nature of this case, owing to the complete absence of perivascular infiltration and the anomalous character of the symptoms. The presence of thrombosed and dilated vessels with numerous haemorrhages throughout the brain-stem, however, makes a diagnosis of encephalitis most probable. The absence of infiltration may be due to the acute nature of the illness.

Case 7.—*Clinical.*—A man, aged 37, seen on Nov. 9th, 1919. Two weeks before he complained of loss of appetite and general weakness, and became very sleepy at times. On Nov. 6th he felt very weak, developed severe pain in the right shoulder and arm, and became alternately drowsy and delirious. There were twitchings of the arms, face, and lips. When seen there was ptosis and facial weakness on the right side, the right pupil was larger than the left, and both pupils reacted but faintly to light and not at all to accommodation. The face was flushed. There was a leucocytosis of 17,000, and the cerebrospinal fluid was normal. The temperature fas 103° F. He became more drowsy, the tremors increased, and he died on Nov. 12th.

Pathological.—At autopsy the vessels of the pia were markedly congested. There was congestion of the white matter of the cerebrum, of the basal ganglia, the mid-brain, especially the substantia nigra, and the pons. No haemorrhages in the floor of the 4th ventricle.

Microscopically throughout the mid-brain there is very marked congestion with perivascular infiltration. In the grey matter anterior to the aqueduct there is a diffuse infiltration of small round cells, especially in the 3rd nucleus. The cells of the nucleus

show considerable degeneration, more marked on the right than the left. Apart from a slight degree of congestion there are no changes in the cerebral cortex.

Comment.—The degeneration of the nucleus of the 3rd nerve corresponds with the ptosis and diplopia, although the degeneration appears of hardly sufficient degree to produce the pronounced symptoms.

Case 8.—*Clinical.*—A healthy woman, aged 26, felt indisposed one morning and complained of headache. There was no diplopia or other localizing symptoms. At mid-day she was seized with great weakness, became paralyzed, sank into a condition of coma, and died the same evening.

Pathological.—The autopsy showed an extensive haemorrhage over the cerebral cortex. No aneurysm or other vascular lesion could be found. The heart was normal.

Microscopically the only lesions found were a massive haemorrhage on the surface of the cerebrum extending down into the sulci, congestion and haemorrhage in the meninges covering the crura cerebri, and a fairly large haemorrhage in the white matter of the mid-brain. There was no undue congestion of the vessels of the brain nor any perivascular infiltration. All the cranial nuclei were normal.

Comment.—It may well be doubted whether this was a case of epidemic encephalitis. Farquhar Buzzard, however, records several cases in which the prominent feature at autopsy was a massive haemorrhage. The occurrence of haemorrhage in the mid-brain indicates that the condition was not confined to the cerebral meninges, and the absence of perivascular infiltration can readily be accounted for by the short duration of the illness.

Case 9.—*Clinical.*—The history of this case is defective. All that is known is that the patient, a man 38 years of age, developed diplopia and marked ptosis, sank into a deep stupor, and died two days later. It is of importance to note that in childhood he suffered from an attack of poliomyelitis which left him with an atrophied right leg.

Pathological.—There is great congestion in the mid-brain, pons, and medulla, many of the vessels showing very deep collars. The cells of the 3rd nerve show profound degenerative changes, the nuclei are eccentric or have disappeared entirely, there is marked chromatolysis, and in many cases the cell is scarcely visible.

All the other cranial nuclei appear to be quite normal.

Comment.—The ptosis is fully accounted for by the extreme degeneration of the cells of the 3rd nucleus.

Case 10.—*Clinical.*—The patient, a man of 40 years, when seen for the first time on Nov. 28th, 1919, was in a condition of stupor, and the general appearance combined with stertorous breathing and spasticity of the limbs suggested a diagnosis of cerebral haemorrhage. For a week he had not been feeling well, complaining of headache, but with no localizing symptoms. On the previous day he became paralyzed, and was plunged into a condition of profound and sudden stupor. On examination he was quite unconscious and could not be roused, the left arm and leg were paralysed, there were twitchings of the right arm and leg, all four limbs were spastic, there was a double Babinski sign, the right pupil was contracted, the left dilated, the blood-pressure was 80, and the temperature 98° F. The patient lay on his back breathing stertorously, the picture of cerebral haemorrhage. He died next day, the temperature rising meanwhile to 103° F.

Pathological.—At the autopsy the pial vessels were extremely congested, and the left hemisphere showed distinct bulging in the parietal region and felt unduly soft. On section there was intense congestion of the whole brain. The left hemisphere was so thickly studded with small haemorrhages as to have a distinctly pink color. The condition was most marked in the parietal and occipital lobes, and the white matter was involved to a greater extent than the grey. The affected part was markedly soft. A similar change was present in a small area in the occipital lobe on the right side. There

was great congestion of the basal ganglia, mid-brain, pons, and medulla, and a few dilated vessels in the floor of the 4th ventricle.

Microscopical examination showed a condition corresponding with the naked-eye appearance. The vessels of the meninges are greatly dilated, but show no haemorrhage and no collars.

Scattered throughout both the grey and white matter of the cerebrum are extremely numerous areas of haemorrhage, which in many cases are curiously spherical in outline. In the centre of many of these areas there is a small vessel, surrounded in some instances by a few cells, almost all of which are polymorphs. The endothelial lining of the vessels is much swollen. In other cases no vessel can be seen. Red cells and polymorphs are scattered diffusely throughout the cerebrum. The nerve-cells appear perfectly normal. The appearance is suggestive of the action of a very acute irritant.

In the mid-brain there is extreme congestion, but no haemorrhage and no collars, although here and there a few polymorphs can be seen around the vessels. The cells of the 3rd nucleus and the substantia nigra are normal. In the pons congestion is marked, and a few vessels show typical collars of lymphocytes and plasma-cells. The 5th, 6th and 7th nuclei are normal. In the medulla there is very little congestion, and the nuclei of the 10th and 12th nerves are normal. The cerebellum is normal. The pituitary body shows marked congestion but no haemorrhage.

Comment.—A case which presented a typical clinical picture of cerebral haemorrhage, and in which the correct diagnosis was not made until the autopsy. It is remarkable for the extensive haemorrhage in the cerebrum with no trace of perivascular infiltration. In the pons, on the other hand, where there were no haemorrhages, perivascular infiltration was present.

Case 11.—*Clinical.*—A woman, 24 years of age, seen on Dec. 16, 1919. Two weeks previously she complained of shooting pains in the upper part of the back, thought to be neuritis. There were twitchings of the muscles of the arms and neck. When the pains left her she felt very drowsy, and slept most of the day. When seen she was in a condition of stupor from which, however, she could be aroused. The eyes were half closed, there was distinct ptosis on the left side, the pupils were contracted and did not react to light or accommodation, there was marked rotary nystagmus of both eyes, the tongue showed tremors, and was deviated to the left, the temperature was 104° F. Ptosis became more marked and bilateral, the stupor deepened, and she died next day.

Pathological.—At the autopsy the meningeal vessels were dilated, there was marked congestion of the mid-brain especially around the aqueduct, but no haemorrhages in the floor of the 4th ventricle.

The nuclei of the 3rd nerves show profound degeneration, distinctly more marked on the left than the right. Some of the cells are swollen, some vacuolated, some pigmented, in many the nucleus has disappeared, and in some there is dissolution of the cell-body. There is no congestion in the neighborhood of the 3rd nucleus, but many dilated vessels and small haemorrhages in the lateral parts of the section. In the 6th nucleus most of the cells are normal, but a few are markedly degenerated. The 7th nucleus is normal, but there is distinct degeneration of the 5th nucleus on both sides. In all the sections there is a considerable degree of congestion, but no collars of cells around the vessels.

Comment.—Here is a case in which the nuclear lesions of the 3rd nerve correspond exactly with the most marked clinical sign, bilateral ptosis more pronounced on the left side. The absence of perivascular infiltration is a somewhat remarkable feature.

Case 12.—*Clinical.*—A child, 16 months of age, vomited several times on Dec. 21st, 1919. He vomited again next day, but was not confined to bed. On the 23rd he was seized with convulsions about mid-day, was admitted to the Children's Hospital, but continued to have convulsions until midnight, when he died. Shortly before death he vomited a large amount of material.

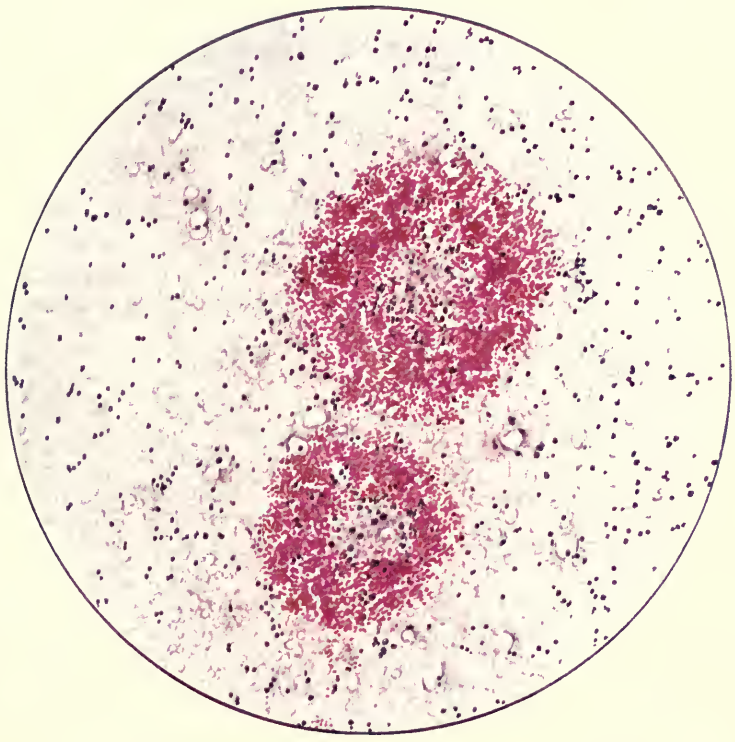


PLATE E.
Hemorrhagic areas in cerebral cortex of Case 10. (High power).

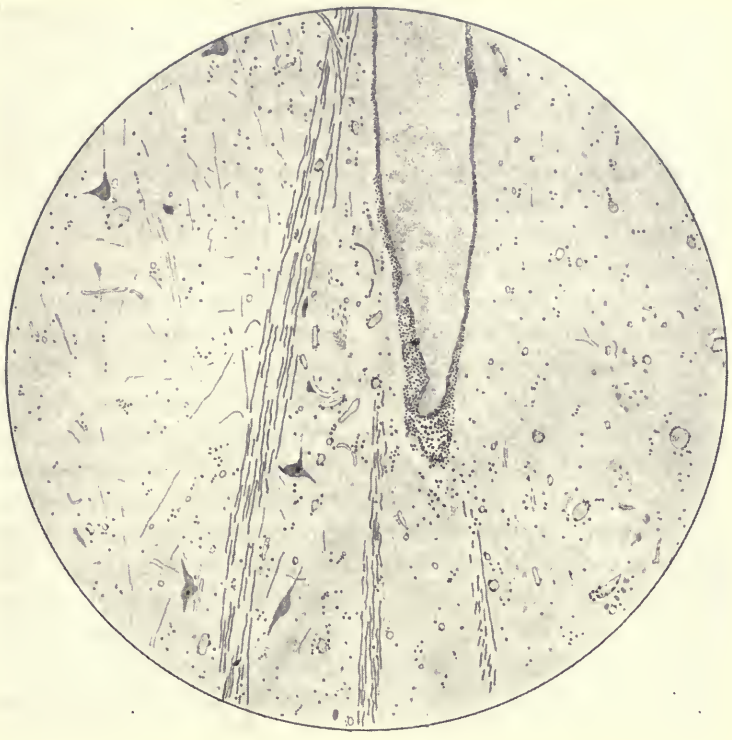


Fig. V. (Case 13). Greatly dilated vessel surrounded by inflammatory cells interrupting the course of two bundles of fibers of the 7th nerve, and pressing upon a third bundle. (Low power).

Pathological.—At the autopsy the brain was congested, and there were numerous haemorrhages in the floor of the 4th ventricle.

In all of the sections there is extreme congestion with many haemorrhages. There is one large haemorrhage in the 10th nucleus on the right side. No trace of perivascular infiltration can be seen.

Some of the cells of the 3rd nucleus are degenerated, but no other cell changes are evident.

Comment.—The absence of perivascular infiltration is noteworthy. It is to be attributed to the extreme acuteness of the attack. The haemorrhage in the 10th nucleus is of interest in relation to the vomiting which was the first symptom noted.

Case 13.—*Clinical.*—A man, 47 years of age, first seen on Dec. 15th, 1919. Three weeks previously a worm, according to his statement, began to gnaw his inside, so he bought a $5 bottle of Sutton's Parasite Cure, drank it all in one evening, and had not felt well ever since. On examination he was extremely drowsy, the face and ears were very cyanosed, and there was marked conjunctiveitis on both sides. There was slight double ptosis, the pupils did not react to accommodation and but slightly to light, the left masseter appeared weaker than the right, there was slight facial paralysis on the left side, the tongue and lips were tremulous, and there was moderate degree of catatonia. The patient became stuporose, and died 5 days later. On the day of death the temperature went up to 107.4° F.

Pathological.—The autopsy showed the usual meningeal congestion, and several large dilated vessels in the floor of the 4th ventricle.

Microscopical examination shows the most intense congestion throughout the brain-stem, together with an extreme degree of perivascular infiltration. One large inflamed

vessel interrupts the course of the 7th nerve on the left side, but the corresponding nerve-cells show no change. Some of the dilated vessels are surrounded by large phagocytic cells containing yellow pigment. The cells of the 3rd nucleus show a marked degree of degeneration. There are a few hyaline bodies scattered throughout the mid-brain.

The cells of Purkinje show no change. The pyramidal cells of the cerebral cortex appear normal, but one or two hyaline bodies can be seen immediately under the pia.

Comment.—The degeneration of the 3rd nucleus corresponds with the ptosis, and the left facial paralysis with the interruption of the corresponding 7th nerve by a large inflamed vessel. The extreme degree of congestion may be associated with the very high terminal temperature.

Case 14.—*Clinical.*—A woman, 50 years of age, first seen on Dec. 15th, 1919. For 10 days prior to that date she had not been feeling well, but did not go to bed. When seen by her family physician on Dec. 11th there was some nausea and vomiting, and temperature was 101° F. During the next three days the temperature fell, but the patient became rambling, delusional, and very restless. There was no lethargy, nor any localizing symptoms. On Dec. 16th she complained for the first time of seeing double. There was a trace of albumin in the urine. On admission to hospital next day she was still very restless and incoherent, and the temperature was normal. She rapidly became weaker, and died on the following day.

Pathological.—At the autopsy there were no special abnormalities apart from congestion.

Microscopical examination shows extreme congestion in every part of the brain, with marked perivascular infiltration; the latter, however, is not seen in the cerebral cortex. The fibres of the 7th nerve and also those of the 12th nerve on the right side are interrupted by dilated vessels. An extremely inflamed vessel is lying alongside the 3rd nucleus on the right side, but the nerve-cells show no change. The 6th and 7th nuclei are normal, but in the 12th nucleus a few of the cells are pigmented.

Under the floor of the 4th ventricle at the level of the 12th nucleus there are very numerous hyaline bodies. As many as 18 were counted in one field under the high power. They differed considerably in size, which is quite unusual.

In the cerebellum there is marked congestion of the molecular and granular layers, and many of the cells of Purkinje show marked degeneration. The cells of the cerebral cortex appear normal.

Comment.—Although both the 7th and 12th nerves were interrupted by dilated vessels there was no corresponding paralysis. Diplopia did not appear until the 9th day of the illness. It may have been due to pressure on the 3rd nerve in some part of its course, for the nucleus appeared normal. It is worthy of note that as the patient became worse the temperature fell to normal.

Case 15.—*Clinical.*—A man, 18 years of age, seen for the first time on Jan. 9th, 1920. For three days previously he had been very drowsy. There was bilateral ptosis, and the facial expression was typical. He became stuporose, developed difficulty in swallowing, and was bathed in perspiration. He died on Jan. 15th.

Pathological.—Throughout the brain there is typical congestion, haemorrhage, and perivascular infiltration. None of the cranial nuclei show any changes. In the pons two greatly dilated vessels are seen lying one on either side of the 7th nerve, probably exerting pressure upon it.

Comment.—The pathological findings did not correspond well with the symptoms observed during life.

Case 16.—*Clinical.*—A man, 40 years of age, was admitted to hospital on Feb. 26, 1920. He was very apathetic and stuporose. There was ptosis on the right side, the pupils did not react to light, there was slight right-sided facial paralysis, and a plantar extensor response on both sides. The temperature was 103° F. He remained in the same

condition for 10 days, at the end of which time the temperature fell to normal, but the patient became actively delirious with visual hallucinations. He then sank into a state of coma, and died on March 8th.

Pathological.—At the autopsy the brain showed the usual appearance of meningeal congestion.

Microscopical examination shows great congestion of the meninges covering the cerebrum and cerebellum, with perivascular infiltration.

Throughout the brain-stem there is intense congestion, many of the vessels being thrombosed. The changes are most marked in the mid-brain, where there is an extreme degree of diffuse inflammatory infiltration of the upper part of the pons. Most of the vessels in the thalamus are thrombosed and show perivascular infiltration.

The nuclei of the 3rd nerves are profoundly degenerated, more especially on the right side. Those of the 6th and 7th nerves show almost no change, but the 7th nerve on both sides shows a great infiltration with inflammatory cells. The cells of the 12th nucleus on the right side contain a marked excess of pigment.

Many of the cells of Purkinje are greatly degenerated, showing pyknosis, chromatolysis, disappearance of the nucleus and even, in some cases, of the cell-body.

Comment.—The ptosis and facial palsy correspond fairly closely with the pathological findings. The terminal excitement is not reflected in the condition of the cerebral cortex.

PART IV

NATURE OF THE DISEASE

This subject has already been somewhat fully discussed in a previous paper by the present writer, but a brief summary may be given here. The disease is an interstitial inflammation with accompanying or secondary parenchymatous degeneration. There is still debate, however, as to whether it is a form of poliomyelitis, a sequel and result of influenza, or a disease *sui generis*.

The influenza hypothesis has many champions. Crookshank[20], Smithies[21] and other writers, using the historical method, point out that previous epidemics of what has been termed sleeping sickness often bore a close chronological relationship to outbreaks of influenza. The same, however, may be said of the relationship between plague and famine in India. The one epidemic may prepare the ground for the other, but further than this one is not justified in going. Indeed the Winnipeg experience suggests that the relation may be apparent rather than real, for 12 months separated the two outbreaks, and most of the encephalitis patients had never had influenza.

The relationship with poliomyelitis is much more close and intimate. Although poliomyelitis is limited to the cord in typical cases, yet in the cerebral form the lesions and clinical manifestations may be very similar to those of encephalitis. Batten[22], in a review of 400 cases of poliomyelitis, found that in 12 per cent, there was evidence of encephalitis involving the medulla, pons, or mid-brain. The pathological lesions in the two conditions, moreover, bear a close resemblance to one another. In both there is congestion, perivascular infiltration, and degeneration of ganglion-cells; in both it is the motor centers on which the main attack falls.

However great the similarity, however, the difference is still greater. A long list of points of dissimilarity might be given, but three will suffice, the first clinical, the second pathological, the third bacteriological.

First, the behaviour of the palsies is very different in the two conditions. In poliomyelitis it is more or less complete and of long duration. In encephalitis it is usually only partial, and characteristically fleeting in its nature.

Second, the pathological picture, although much the same in the two conditions, yet presents important differences. Poliomyelitis is much more a true inflammation of the grey matter with cellular degeneration playing a major part, whereas in encephalitis the inflammation is essentially interstitial with secondary cellular degeneration occupying

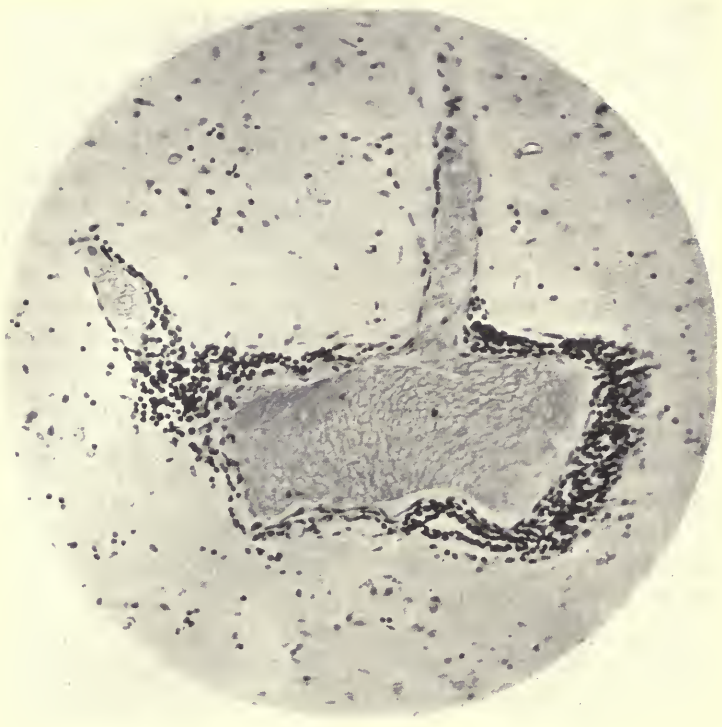


Fig. VI. Perivascular infiltration in syphilitic disease of the brain (general paresis), showing similarity to the condition found in encephalitis. (Low power).

a minor position. Moreover, the occurrence of marked perivascular infiltration in both by no means constitutes a proof of their identity, for it is a characteristic feature of the histological picture in cerebral syphilis and in trypanosomiasis.

Third, if the recent work on the bacteriology of the disease be confirmed it is evident that the two conditions are quite distinct. A previous attack of poliomyelitis is supposed to confer an absolute immunity, whereas in one of our fatal cases of encephalitis there had been a typical attack of poliomyelitis in childhood, leaving the patient with permanent weakness of one leg.

Epidemic encephalitis, then, appears to be a separate disease entity, due, according to Loewe and Strauss[23], to a minute filter-passing organism which can be grown under anaerobic conditions by the Noguchi method. These workers claim to have reproduced the disease in monkeys and rabbits by intra-cerebral injections of brain emulsion and naso-pharyngeal washings from cases of encephalitis. Injection of cerebrospinal fluid was also successful, thus sharply differentiating the condition from poliomyelitis. Levaditi and Harvier[24] have confirmed these observations, and find that the virus can be preserved in glycerine and readily transmitted from rabbit to rabbit.

CONCLUSIONS

1. The complete clinical picture of lethargic encephalitis can be readily recognized. Many atypical forms, however, may occur. These on the one hand may resemble such severe conditions as cerebral haemorrhage or uraemia, or on the other hand they may appear so slight and trivial that the correct diagnosis is missed.

2. It is probable that the infection is widespread during an epidemic, and that carriers may spread the disease.

3. It would appear that the incubation period is about two weeks.

4. Tremors and myoclonic contractions are of common occurrence.

5. Late sequelæ of the nature of muscular spasms are to be looked for. Optic atrophy and other after-effects have been noted.

6. A remarkable epidemic of hiccough appeared synchronously with the encephalitis epidemic.

7. The pathology may be summarized as interstitial inflammation of the central nervous system with secondary parenchymatous degeneration.

8. In a number of cases of cranial nerve disturbance the corresponding nerve fibres were pressed upon by greatly dilated vessels, the nuclei being comparatively normal.

9. In seven cases peculiar hyaline bodies, apparently the result of degeneration, were found in the central nervous system.

10. The disease presents somatic as well as cerebral manifestations. Widespread haemorrhages were present in the serous membranes in three cases, pointing to a general septicæmic condition.

11. Vascular and degenerative changes were present in the kidneys in many of the cases.

In conclusion, I wish to express my great indebtedness to Prof. J. C. B. Grant of the Department of Anatomy for invaluable assistance in the localization of the various cranial nuclei.

REFERENCES

1. Boyd, W. The Winnipeg epidemic of encephalitis lethargica. Can. Med. Assoc. Jour., Feb., 1920.
2. Breinl, A. Clinical, pathological and experimental observations on the mysterious disease. Med. J. Austral., March 16, 1918.
3. Sabrazes, J., and Massias, C. Abortion forms of lethargic encephalitis. Gaz. hebd. d. Sci. Med. de Bordeaux, Feb. 8, 1920.
4. Sabatini, G. Lethargic encephalitis. Polichinco, Rome, Jan. 26, 1920.
5. Barker, L. F., Cross, E. S., and Irwin, S. V. On the epidemic acute and sub-acute non-suppurative inflammations of the nervous system prevalent in the United States in 1918-19. Am. Jour. Med. Sci., Feb. and March, 1920.
6. Netter, Blochi, and Dekenwer. Sugar content of the cerebrospinal fluid in lethargic encephalitis. C. R. Soc. Biol., March 20, 1920.
7. Wegeforth, P., and Ayer, J. B. Encephalitis lethargica. J.A.M.A., 1919, lxxiii, 5.
8. Reilly, T. F. A hitherto undescribed sign in the diagnosis of lethargic encephalitis. J.A.M.A., 1920, lxxiv, 735.
9. Sicard and Kudelski. Myoclonic acute encephalitis. Bull. de la Soc. med. des hop., Paris, 1920, xliv, 94.
10. Boveri, P. The myoclonic form of epidemic encephalitis. Brit. Med. Jour., April 24th, 1920.
11. Gotti, G. Gior. di Clin. Med., March, 1920 (Brit. Med. Jour. Epitome, May 1st, 1920.)
12. Bassoe, P. The delirious and the meningoradicular types of epidemic encephalitis. J.A.M.A., 1920, lxxiv, 1009.
13. Buzzard, E. Farquhar, and Greenfield, J. G. Lethargic encephalitis: its sequelae and morbid anatomy. Brain, 1919, xlii, iv.
14. Von Economo. Chronic lethargic encephalitis. Munch. Med. Wochrschr., 1919, lxvi, 1311.
15. Netter, A. Lethargic encephalitis. Bull. Acad. de med., Paris, 1920, lxxxiii, 303.
16. Hamilton, D. J. Text-book of Pathology, p. 584.
17. Bassoe, P., and Hassin, G. B. A contribution to the histology and pathology of epidemic ("lethargic") encephalitis. Arch.Neurol. & Psych., 1919, ii, 24.
18. Calhoun, Henrietta A. Histopathology of the brain and spinal cord in a case presenting a postinfluenzal lethargic encephalitis syndrome. Arch. Neurol. & Psych., 1920, iii, 1.
19. Marinesco, G. Lethargic encephalitis. Bull. Acad. de med., Paris, 1918, xxx, 41.
20. Crookshank, F. G. The history of epidemic encephalitis in relation to influenza. Med. Press., 1919, Nov. 19, 26, Dec. 10th.
21. Smithies, Frank. Quarterly Medical Clinics, 1920—Vol. I, No. 2—April.
22. Batten, F. E. Acute poliomyelitis. Brain, 1916, xxxix, 115.
23. Loewe, L. and Strauss, J. The diagnosis of epidemic encephalitis. J.A.M.A., 1920, lxxiv, 1373.
 Strauss, Hirshfeld and Loewe. Studies in epidemic encephalitis. N. York Med. Jour., 1919, cix, 772.
24. Levaditi and Harvier. Bull. Acad. de med., Paris, April, 1920.

THE NEED OF EARLY DIAGNOSIS AND TREATMENT OF CHOLEDOCHITIS, CHOLECYSTITIS AND CHOLELITHIASIS.

THE FURTHER CONSIDERATION OF A NEW AND DIRECT MEDICAL METHOD OF DIAGNOSIS AND TREATMENT OF DISEASES OF THE BILIARY SYSTEM*

BY B. B. VINCENT LYON, M.D.,

Associate in Medicine, Jefferson Medical School, Chief of Clinic, Gastro-Intestinal Department, Jefferson Hospital, Philadelphia, and Visiting Physician, Methodist Episcopal Hospital,

PHILADELPHIA.

THERE is probably no six inches of the entire alimentary canal that is as prone to develop states of organic disease as are the first and second portions of the duodenum; nor is there any zone into which the elements of differential diagnosis enter in a larger and, at times, more perplexing manner. This, "the hot bed" of digestion, has emptying into it the mixed or mixing secretions (and excretions?) from the stomach, the liver, the gall-bladder, the pancreas and the secretion from the duodenal mucosa itself.

The physiology concerning the discharge of the digestive secretions in normal people from these various sources has become better understood during recent years. The pathological physiology of states of disease in this zone has been the subject of much profitable investigation during a still more recent period. Much light has been thrown upon the subject by means of carefully conducted animal experimentation. But it is probable that the more wide-spread use of the duodenal tube in the hands of capable students of gastro-intestinal disease is contributing very greatly to our knowledge by clinical experimentation on human beings, both normals and those suffering from disease. We have learned how to interpret our findings in the duodenum much more clearly and accurately; we can quite easily determine states of duodenitis and can differentiate those that are catarrhal, those that are infected, and those which show unusual exfoliation of dead and dying epithelium; we can feel reasonably sure of separating our more superficial erosive states from those of true ulceration simply because we are gradually training ourselves *to make better use* of the materials recovered by means of the duodenal tube for more painstaking cytological, bacteriological and chemical studies.

Our differential diagnosis has been gradually extended so that we are now fairly sure of the soundness of our investigations into pancreatic states of health or disease, although there remains a very great deal of work to be done in this field. We have made, too, considerable progress in our ability to accurately diagnose many of the states of disease of the biliary system. But, unfortunately, most of our fruitful efforts, as in the cancer problem, have resulted in the elaboration of various methods and various tests that concern themselves in the *provement* of disease *already well established.*

Furthermore, our methods of diagnosis have been more largely *indirect* than direct. We have learned the value of the carefully taken and searching inquiry into the presenting symptoms, we have learned to interpret

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more clearly the transition of the earlier symptoms into those that in themselves are almost diagnostic; we have extended the scope and the accuracy of our methods of physical examination and our eyes and our fingers have gradually been trained to take cognizance of minuter abnormalities than would have been thought possible a generation ago. Much of this has only been made possible through the extraordinary pioneering efforts of the surgeons, who have taught us by object lessons in living pathological anatomy at the operating table, the correct interpretation of historical syndromies and of the data gained by the physical examinations.

We have made great progress, too, in the art of diagnosis of various of the biliary diseases, as we have caught the importance of focal infection and its march from primary to secondary fields of activity; by the more recently accepted methods of examination of blood chemistry we have learned the significance of an increased amount of cholesterol in the blood-serum and have connected up some of the clinical links regarding the incidence of pregnancy, tight lacing, etc., with gall-bladder disease, especially in relation to the formation of gall-stones. As a more direct means of diagnosis, we have turned to the roentgenologist for the important aid he can now furnish us with his positive and negative shadows of formed calculi or of increased connective tissue formation in the wall of the pathological gall-bladder. But direct as is the evidence given by the *x*-ray, it fails us, perhaps, in half of our cases, and even when supplied serves only to prove a pathological state already well established. *In other words, the greater part of our diagnosis of gall-bladder problems, thus far made practical, supplies us with information pointing to disease so fully developed that we have been handicapped in applying methods of treatment which, to be successful in ultimate cure, have become more and more radical.* The field of treatment by almost common consent has fallen to the surgeon because our accepted methods of medical management have woefully failed to bring results other than the temporarily palliative.

For a little over three years I have taken great interest in developing a more *direct means of differential diagnosis of diseases of the biliary system* which lends itself admirably not only to the direct detection of organic disease well established, but also gives promise of a better understanding of functional disorders of the liver and gall-bladder and the recognition of pathological physiology which may act as part of the precursory states in the development of the later full-blown disease.

We have known for sometime that it is possible to drain bile from the common duct and from the liver and collect it by means of the duodenal tube for examinations that have been directed largely to the estimation of pancreatic efficiency. But a great step forward was made when Meltzer suggested to us a means of making the *gall-bladder contract* and discharge, when possible, its contents. This has opened an entirely new field of clinical diagnosis and investigation and has widened the horizon of our vision for the recognition and correction of the early states of disease of the gall-bladder and ducts that may ultimately lead us to the goal of present-day medicine, namely, the prevention of another group of diseases which has claimed a heavy toll of suffering and death. I allude to gall-stones and serious late states of infection of the gall-bladder, liver and its ducts.

Meltzer[1], in his excellent article giving his very rational conception of the physiology of the filling and discharge of bile from the gall-bladder, as governed by his "Law of Contrary Innervation," appended a little footnote to the effect that he found that solutions of magnesium sulphate, when locally placed in the duodenum, *without first passing over the gastric mucosa,* would cause a relaxation of the tonus of the duodenal wall and would thereby relax Oddi's sphincter of the common duct and permit the discharge of bile into the duodenum.

Immediately after the publication of Meltzer's paper in April, 1917, I was able to demonstrate that the local use of magnesium sulphate in solutions of various strengths in the

duodenum of human beings would very promptly deliver bile through the duodenal tube in varying quantities and of varying quality. It would do this when the duodenum was previously bile free, indicating that the magnesium sulphate had relaxed the sphincter action of Oddi's muscle. Further than this it was noticeable that the character of the bile recovered by means of the duodenal tube underwent certain definite changes in color and viscosity, first a light lemon to golden yellow, then a deeper, richer, more syrupy golden yellow and finally to a very uniformly light lemon yellow, thinner and less syrupy than either of the first two; *and that this sequence occurred in all normal cases.*

It was not long, however, before I examined a patient suffering from symptoms strongly suggestive of biliary disease in whom the second sequence of delivery of the deeper golden yellow bile was replaced by the recovery of over five ounces of deep greenish black bile very viscid, almost tarry. What did this mean? Where was this bile coming from? The natural inference was that it was coming from the gall-bladder. But could it be really possible to drain the gall-bladder by magnesium sulphate and the duodenal tube and get its contents out in a bottle? Yet the cytology of this bile microscopically revealed mucopurulent particles rich in pus cells, large masses of deeply bile-stained columnar epithelium, inflammatory debris, masses of bile crystals and was simply swarming with bacteria, chiefly cocci. Culturally the latter turned out to be Streptococcus viridans. The patient was operated on ten days later and the gall-bladder found to contain bile of the same black color and viscosity and Streptococcus viridans was isolated from the bile.

This case and the several that had preceded it were the starting-point in the use of the method which I first described in a paper[2] published seven months ago after I had made more than a thousand observations of the practicability of a non-surgical method of biliary drainage. With certain exceptions, to which I shall later call your attention, it is possible to drain the gall-bladder wholly or partially of its fluid contents; to drain the bile-ducts and to obtain bile freshly secreted from the liver cells. Furthermore, it is possible to segregate these several biles from these several sources by collecting them in individual bottles for chemical, microscopical and bacteriological examinations that give us a *direct* method of differential diagnosis between various diseases of the biliary system.

In the *direct evidence* it furnishes us it far surpasses any diagnostic method yet available, and materially assists our correct interpretation of the presenting history, the physical examination, and the information furnished by the Roentgen Ray and by the laboratory examinations into the state of gastric chemistry and motility and of the stools, urine and blood chemistry. But most important of all, it furnishes direct diagnostic evidence of the *beginnings* of biliary stasis, of "masked" focal infection that precede the more florid states of biliary disease and give rise later to the symptoms, the physical and laboratory findings that are usually so clear-cut as to make a tentative diagnosis of "gall-bladder disease" quite tenable and to warrant the dictum, "We will do an exploratory operation and find out what the trouble really is." This is all very well for the doctor, but a little rough on the patient if there is another reliable and direct alternative method available. In other words, we must learn how to find the direct evidence in the early cases exhibiting the chronic but vague dyspeptic symptoms and not leave it to the "exploratory" operation to decide whether the trouble lies in the upper right or the lower right abdominal quadrant. Even with the stomach, duodenum and gall-bladder nicely exposed the surgical eye and finger often *fails* to detect the presence of an *early* cholecystitis, choledochitis or duodenitis, (usually the forerunner of ulcer), because there is no recognizable *gross* pathology, (quite ignoring the *pathological physiology* that precedes gross pathology), and the appendix is then removed usually because it presents sufficient pathology to warrant it,

but not infrequently it is quite innocent and is removed simply "because the abdomen is open and it doesn't increase the risk of the operation".

What is the result of this? If there is present concomitant disease of both appendix and gall-bladder, as Rosenow's work on streptococci leads many to suspect, and if the gall-bladder is harboring streptococci, but in a state of "masked focal infection", not severe enough to develop diagnostic symptoms with parallel gross pathology, but nevertheless sufficient to produce pathological biliary physiology and a positive bacteriology to be found by him who looks, the result is this: The surgeon "explores", and finds no upper abdominal pathology, no enlarged glands, no stones, no adhesions and the gall-bladder expels its contents under forcible digital pressure, (but can it do so under its *own muscle power?*), and because there is *no gross* pathology the surgeon says everything is normal here, leaves a *gall-bladder harboring streptococci,* and proceeds to account for the symptoms by removal of the appendix. The patient gets well, that is to say, he recovers from the operation, his symptoms improve temporarily, aided by his hospital bed rest and the removal of his appendix, provided it was truly pathologic; but usually between six and twenty-four months later his symptoms recur, progress in frequency and severity, and change in character until finally the clinical picture of full-blown gall-bladder or duct disease presents itself and again operative interference becomes imperative in the judgment of most doctors.

This is not to be wondered at, for it is true that operative interference is the best procedure at the present time *in properly skillful hands.* The surgeons have successfully pioneered the fields of gall-bladder therapy because the indirect efforts of the Internist with his cholagogues and bile disinfectants, his medicated waters, his diets and his prescription to attend expensively famous foreign spas have been too inadequate and uncertain, whereas the direct attack by the aseptic scalpel is productive of prompter results whether good, bad, or indifferent. As Dr. Deaver[3], so apt always in his quotations and epigrams, says in a recent paper, "If thy right hand offend, cut it off". But let us pause a moment and consider. Of course it is easy for the skillful surgeon to "cut it off", but it is quite another matter to put it on again if the first experiment doesn't work. It is one thing to remove with impunity the appendix which possesses no (or an unknown) function, (although many an innocent one has been removed in the past, as have healthy tonsils and teeth during the respective "crazes"), and quite another thing to ruthlessly and routinely remove every gall-bladder because some harbor streptococci in their lymphatic tissue and in their walls. As I have said it is all very well with the patient if it works. But suppose (and we know that this often happens, for the surgeons tell us) the common duct remains infected after surgical drainage is completed and later becomes obstructed, what happens then when the distensible reservoir for liver bile has been removed? The safety valve has blown off. The common duct dilates and vicariously tries to assume the duties of the gall-bladder; diverticula may appear, duct bile becomes static, new concretions form, and sooner or later the secreted bile dams back into the liver and biliary cirrhosis has begun. Dr. Deaver's Biblical quotation is apt, but the title to his paper, "Operation and Reoperation for Gall-Stone Disease", is still more apt. Besides the mortality table is not published.

Perhaps if the careful student of internal medicine should adopt the motto, "Search and ye shall find", it may eventually be better for the patient, although the work may be slow and laborious and lacking in spectacular brilliance. One has only to peruse some of the better recent papers on gall-bladder surgery to realize that operation means facing undeniable risks. Although the mortality has been steadily reduced it was nearly six per cent in the 1000 cases recently analyzed by Smithies[4], with 35 per cent of associated pathological lesions of the upper abdomen found at operation, (enlarged lym-

phatic glands, acute and chronic pancreatitis, enlarged liver and peptic ulcer), indicating late diagnosis with well established pathology. Added to this are the complications pictured by the surgeon—the skilled full-time operator and not the "occasional surgeon"—of damage to the hepatic and common ducts, the recurring adhesions, the persistent fistulas, the occasional fatal bleeding from the liver or from an accidentally torn blood-vessel, the occasional traumatic puncture of the gut or the spilling of infective streptococcic bile with resultant peritonitis, to say nothing of Nature's recurrent complications of new stone formation in already dilated common ducts again obstructed, necessitating recurrent operations, and we have a true picture of the gall-bladder problem as it stands in the light of our present methods of diagnosis and treatment. Certainly it is far better than it used to be, but is it as good as we can make it?

Description of the Method

In order to present the method which I hope can be proved in other hands to possess the merits of early (or late) direct diagnosis into gall-bladder and duct disease, and of potential merits in the treatment of selected patients suffering from these diseases, I must go briefly again into the fundamental principles which underlie the method. Much of this has already been presented in four previous papers on the subject (5, 6, 7, 8).

The biliary system consists of a constantly secreting organ, the liver, passing its secretion (the bile) down a series of tubes guarded at their terminal outlet by a muscle possessing sphincter action. Placed between the liver and Oddi's muscle sphincter is the gall-bladder with elastic walls permitting of various degrees of physiological distensibility to act as a reservoir for excess bile secreted during the periods when the duct sphincter remains closed. Thus we have a mechanism that physiologically consists of the elaboration of a *constantly secreted* fluid, which, however, is *discharged intermittently.*

Upon what does the mechanism of emptying, partially or wholly, this biliary system depend?

Meltzer's "Law of Contrary Innervation"[9] as he applied it to the filling and discharge of the gall-bladder was briefly to the effect that the sphincter of the common bile duct and the muscles of the gall-bladder were supplied with inhibitory and motor nerve fibres from the splanchnic and vagus nerves which act antagonistically to one another. That when the inhibitory fibres relaxed the tone of Oddi's muscle at the sphincter of the common duct, the motor fibres to the gall-bladder caused its muscle to contract and therefore discharge its stored-up bile into the duodenum until such time as the sphincter would contract again, when, automatically, the inhibitory fibres to the gall-bladder would cause a relaxation in the gall-bladder wall, thus preventing a further expulsion of its bile and it would then resume its passive rôle of acting as a reservoir for the bile freshly secreted from the liver. Meltzer pointed out that the normal physiological stimulus to produce biliary discharge lay in the character of the food chemistry which passes across the duodenum. To establish this he quotes the experimental work of Bruns, which showed that normally no bile appeared in the duodenum as long as the stomach was empty, but that the entrance of a food chyme into the duodenum was the signal for the ejection of bile from the common duct. He further quotes the experiments of Rost who proved that injection of peptone or albumoses through a duodenal fistula in a normal dog causes immediately a discharge of bile from the common duct and proved that this takes place by a reflex act which causes a contraction of the gall-bladder and simultaneously a relaxation of sphincter of the common duct. Furthermore, Rost has previously established the fact that after animal *cholecystotomy* the escape of bile through the papilla of Vater became continuous, whereas in normal animals it was discharged intermittently. This argued strongly in favor of Meltzer's "Law of Contrary Innervation" in the fact that simple cutting into the wall of the gall-bladder would destroy the antago-

nistic action of the nerve supply to the gall-bladder and common duct sphincter. This mechanical breaking of the nerve circuit by operation can be easily demonstrated after operations in which the gall-bladder has been either opened or removed; namely, bile is being discharged continuously into the duodenum so long as the common duct remains unobstructed. Furthermore, I believe this break in nerve conduction is mimicked in disease involving the wall of the gall-bladder or in the wall of the duodenum adjacent to Oddi's muscle, (duodenal ulcer, duodenitis, duodenal adhesions), because in this type of case I am frequently finding continuous discharge of bile into the duodenum with reflux of grossly recognizable bile in the fasting stomach in early as well as late states of pathology of the duodenum and of the gall-bladder. This observation of what is certainly pathological physiology appears to me to be a very important diagnostic factor in itself and useful because it may be indicative of early changes. The significance of fasting and digesting biliary regurgitation will be the subject of a future communication.

In regard to magnesium sulphate, although Meltzer did not specifically state in his footnote that it would cause expulsion of gall-bladder bile, but only that it would relax the duct sphincter, the inference was plain that if his "Law of Contrary Innervation" were sound, *anything* which would cause inhibition of tonus of Oddi's muscle must *ipso facto* cause contraction of the gall-bladder musculature. This is not so. Yet it is fortunate for the progress of this work that Meltzer was experimenting with magnesium sulphate for it *will* call into action this antagonistic or reciprocal action of duct sphincter and gall-bladder.

But there are other substances, (benzyl-benzoate, belladonna, potassium permanganate), that will relax the duct sphincter and *yet will not produce expulsion of gall-bladder bile.* Similarly there appears to be a selective gastric food chemistry that will electively cause expulsion of gall-bladder bile in large quantities on the one hand and discharge of pancreatic secretion on the other hand. For instance, as Rost has already experimentally shown, peptones and albumoses, (end products of acid gastric digestion), will call forth in the duodenum a richer and larger quantity of bile. This is seen in the proteid test meals. Whereas, a carbohydrate meal, although bathed in the same acid gastric juice will call forth more pancreatic juice and very little, if any, of the gall-bladder bile, although naturally the bile in the common duct and that secreted by the liver is being discharged during the time that pancreatic secretion is being poured out. This appears to support the accepted theory of the physiology of automatic (or reflex) discharge of digestive secretions or enzymes *according to the chemistry of the food stuffs to be digested.* What the exact character of this mechanism may be, whether nerve reflex or blood reflex or true hormonic action, or a mixture of them, will require further investigation both on animals and on human beings. But when we remember that the pancreatic duct and the bile ducts in ninety per cent of anatomical subjects discharge their contents through a *common ampulla* governed apparently by the same sphincter, in each case the sphincter itself must relax to permit such discharge, yet the gall-bladder may not necessarily contract each time, certainly not with the same degree of vigorousness. So it appears to me that while Meltzer's theory of the physiology of filling and discharge of the gall-bladder bile is exceedingly thoroughly worked out, and while his "Law of Contrary Innervation" is substantially sound as regards magnesium sulphate, (perhaps in this direct duodenal action a true hormone for gall-bladder contraction), nevertheless there are certain substances, (drugs and food chemistry), although they relax the common duct sphincter, have an elective action on the gall-bladder or on the pancreas individually, and no doubt certain substances may have a dual action.

A great deal of this problem of physiology remains to be worked out before we can get away from a certain empiricism in the use of various diets and various drugs. The method

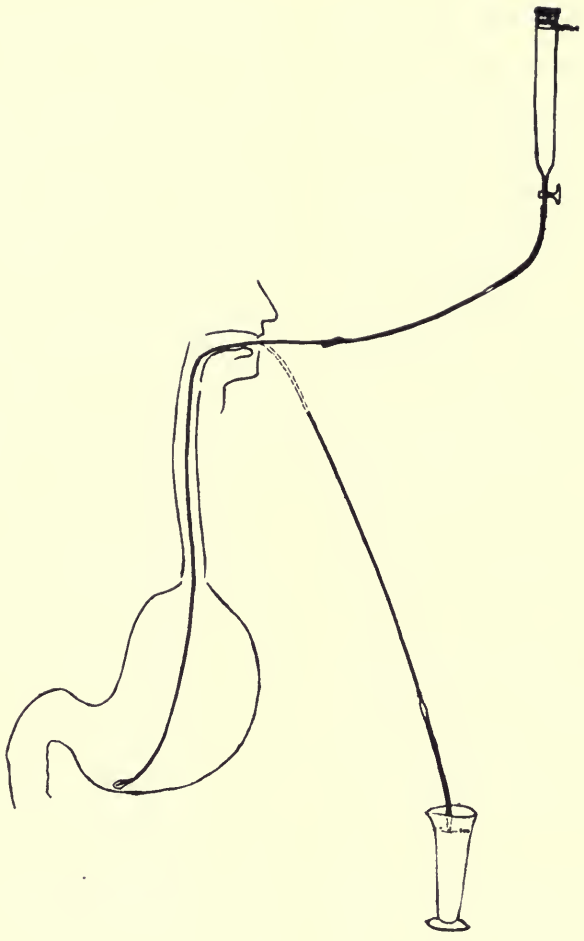


Fig. I. Diagram illustrating the method of lavage advocated by the author, using small amounts of lavaging fluid (250 c. c.) at a time, recovered in graduated glass for gross inspection and for cytological examination in pathological cases.

of direct clinical investigation in health and disease by the duodenal tube, using various chemicals and food chymes opens up a most attractive and profitable field of work.

To return to the subject of this paper—the method that I have suggested permits of making *direct observations* on the bile obtained from the several sources in the biliary tract.

To make possible accurate diagnosis of the duodenal-biliary zone it is, of course, necessary that we adopt means to prevent cytological and bacterial contaminations from the mouth, teeth, tonsils, respiratory tract and stomach from confusing us in our interpretation of duodenal and biliary materials. To prevent this so far as possible I have adopted the following routine method in *diagnosis.* The patient presents himself with a twelve-hour fasting stomach. He then brushes his teeth thoroughly, rinses and gargles his mouth and throat thoroughly, first with a strong solution of potassium permanganate (1 grain to the ounce), then with a mildly astringent solution of zinc chloride. The duodenal tube which has stood overnight in a 2 per cent solution of lysol is freshly sterilized by boiling and is passed to the stomach, the fasting residuum is aspirated and set aside for chemical, cytological and bacteriological examination for comparison with the findings later recovered from the

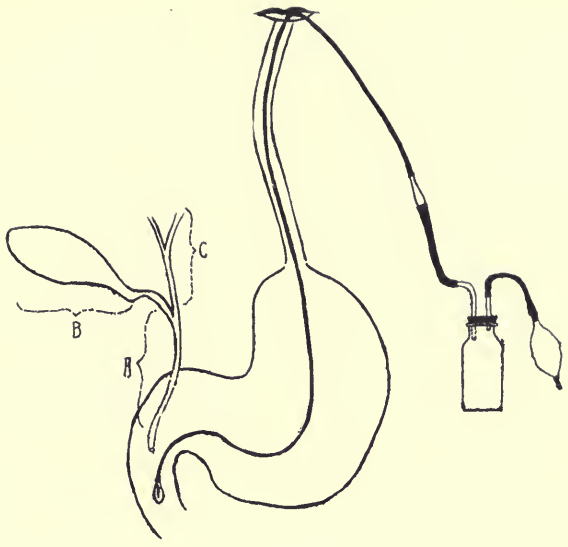


Fig. II. Diagram illustrating the method of non-surgical biliary drainage, part of the apparatus used, and the sources from which the various types of bile are obtained. A set of three or more sterile bottles is used for each segregation of bile for diagnosis.

duodenum. The stomach is then rinsed to sparkling clearness, (using gravity douching from 250 c.c. irritating tanks or syringe douching, recovering the wash water in 250 c.c. conical graduates in which can be noted how clean or "dirty" the stomach is, mucus, shreds, mucopurulent plugs, etc., which microscopically yield much valuable information). After the wash return is *sparkling clear* the stomach is astringed with zinc chloride solution, (Lavoris), and then rewashed thoroughly. It is surprising to note how often a stomach apparently washed clean, after being astringed, (which literally shrinks the mucosa), will press out from the mucosal tubules mucopurulent masses which plug the ducts and which, microscopically, show, in true gastritis cases, masses of gastric epithelial cells infiltrated with small round cells and polynuclear leucocytes and swarming with bacteria. It is to be noted that none of this epithelium is ever bile stained. After astringing and washing clear again, the stomach is then "disinfected" with 250 c.c. of potassium permanganate, or silvol, 1 to 10,000, which is immediately recovered and the stomach *again* washed clean to crystal clearness. This requires about twenty minutes to accomplish. This so far as it is possible, prevents contaminated material from the upper zones confusing our interpretations of material from the duodenal-biliary zone. A little water is then left in the stomach to encourage peristalsis, the patient lies down and turns on his right side and very slowly swallows an additional 20 cm. of tubing to a total distance of 75 or 80 cm. from the teeth, according to the length of the thorax. I insist that they take twenty minutes to swallow the 20 cm.; slowly swallowing at this point is often the secret of rapidly entering the duodenum. The duodenal tube is then connected to the first sterile aspirating bottle and the duodenal secretion is aspirated to note whether the common duct sphincter is normally closed. The duodenum is then douched with about 75 cc. of a 33 per cent solution of magnesium sulphate. This, I believe, to be the optimum strength for good sphincter relaxation and gall-bladder contraction. (Where the gall-bladder is found atonic it is sometimes necessary to restimulate its contraction discharge by douching again with half the amount of magnesium sulphate solution).

Before the magnesium sulphate has entirely run in, the tubing is connected to the bottle and gentle aspiration started and the magnesium sulphate returns at first uncolored but within one to six minutes, normally, the sphincter is relaxed and the magnesium sulphate returns tinged with bile, the latter then becomes steadily deeper until pure bile alone is being recovered. Another bottle is then attached and observations made through the glass cannula window inserted in the tubing about 8 inches from its proximal end. When the first bile, (which I call "A" bile and believe to be that contained in the common duct plus a few drops from the cystic duct and a few mils, perhaps, of freshly secreted liver bile passing down the hepatic ducts), deepens to a distinctly deeper golden yellow or becomes in any way "off" color and more syrupy and of heavier viscosity, this bottle is detached, another quickly attached and drainage of this darker bile allowed to continue until the third transition to a thinner lemon-yellow bile appears, when a final bottle is attached to continue the bile collection generally to the end of the drainage period.

The darker bile appearing in the second transition, I call "B" bile and believe to be derived almost entirely from the gall-bladder, (mixed, of course, with a few drops or mils of liver bile). My reasons for believing this bile to be gall-bladder bile I have given at some length in a previous paper. The third type of very light yellow limpid bile which appears in normal cases in the third transition I call "C" bile and believe it to be bile recently elaborated by the liver cells and freshly secreted. It has invariably appeared at the termination of each drainage in nearly 2000 observations which I have made up to this time. Of course, one cannot hope to segregate these several biles absolutely unmixed with the others, but if one is careful to "sit down to the job" of segregating them it is surprising how accurately they can be separated with a little practice, and I feel safe in saying that, if carefully done, the majority of "A" bile is common duct bile, that by far the majority of "B" bile is derived from the gall-bladder and, if the latter has emptied completely, that practically all of "C" bile is freshly secreted liver bile.

Diagnosis is then developed around the direct study of the bile and the manner of its discharge—the promptness with which "A" and "B" biles appear, the amount of "B" bile and the steadiness or the intermittency of its discharge, (suggesting normal tonus, subtonus or hypertonus of gall-bladder musculature and inferences as to its capacity); on the gross appearance of the several biles, (color, consistency, viscosity, transparency, turbidity, flocculations, mucus, etc.,); and especially the careful examination into the cytology, (epithelium, whether bile-stained, its source; pus, leucocytes, crystals, concretions, red blood corpuscles, inflammatory debris, mucus, bacteria); into the chemistry, (lecithin, cholesterin, calcium, pigments, effervescence on acidification, etc.); and into the bacteriology by culturation of each of the segregated samples of bile.

The cultivation of bacteria must be especially carefully conducted and must be done *promptly* to prevent the overgrowing of streptococci, pneumococci and other less hardy organisms with the more rapidly growing colon groups, Bacillus pyocyaneus and Bacillus subtilis. Cultures should be made in the office, clinic or hospital, when the bile is withdrawn, and planted in glucose broth flasks or blood-agar tubes, and a third sample put in a sterile test-tube, labelled and promptly sent to a pathologist or bacteriologist, unless the practitioner is qualified and anxious to do the work himself.

I have learned that I get more reliable cultures from planting the mucopurulent flakes themselves, especially when heavily bile-stained these, particularly those of "B" bile, sink to the bottom of the bottles. These mucopurulent flakes are lifted out by a sterile pipette, are representative of material from the floor or walls of the gall-bladder, ducts, or duodenum. Microscopically they show by far the most interesting and conclusive cytology. If more cultures from the gall-bladder at operation were taken from the mucopus from the floor of the gall-blad-

der and not simply from the supernatant bile, I believe the average of positive cultures would be much higher, whether the gall-bladder does or does not show gross pathology. Withdrawing bile by a sterile hypodermic needle and syringe often gets just the supernatant bile. I wish to emphasize the need for careful cultural technique and prompt handling. For much important differential diagnosis hinges on this.

Again I would like to point out that it may be possible to decide by taking *colony counts,* where the source of the maximum infection may be, even though "A", and "B", or "A" and "B" and "C" biles *all* deliver, for example, streptococcus and colon bacillus. For instance, if you plant so many loopfuls of "A" and "B" biles and "sow" them through blood-agar petri-plates and find that "A" bile grows seven colonies and "B" bile ninety-four, it is reasonable to conclude that the major source of the infection is the gall-bladder and not the duct. Similarly, if the colony counts from "C" bile are far larger than "A" or "B" the liver is to be suspected of being truly infected.

This plan is working out well and checking up well in differential diagnosis. I do not see now, however, how we can ascertain definitely whether or not the wall of the gall-bladder or of the ducts, or the duodenal mucosa is definitely infected beyond the possibility of recovery by free drainage and topical treatment and sensitized vaccines.

These direct diagnostic findings can, therefore, be used to amplify or to interpret the information secured from the history, the physical examination and from special examinations, such as the x-ray, stool, stomach and blood.

We can thus progressively hope to modify in the future the one time true statement of Stockton[10]: "It is difficult to reach a clinical knowledge as to the amount of bile that is being passed and as to the various constituents of the bile", and the statement of Smithies[11]: "The average text book considers cholecystitis in a vague uncertain way, as though it were not an ailment second in frequency to all intraabdominal disease only to lesions of the appendix. Commonly, cholelithiasis meets recognition as an acute dramatic, abdominal crisis, in which the chief rôles are played by colic, chill, fever, sweat and jaundice."

The *differential diagnosis* between *choledochitis* and *cholecystitis* depends to a large extent on the bacteriology and cytology plus the gross normality or abnormality of the bile. This will be referred to in greater detail when the diagnosis of atony of the gall-bladder is discussed. Of course, if the gall-bladder has previously been removed the problem is easier. Empyema of the gall-bladder is easiest to diagnose directly provided the gall-bladder is mechanically able to discharge a specimen of its contents. Dr. Brown of Miles City, Montana has recently told me that he has examined some 70 or more suspected gall-bladder cases by this method. Among them were four cases of empyema successfully and directly diagnosed and two of the four he had successfully drained and tided over acute complications that did not warrant the risk of surgery at the time.

Regarding the *diagnosis of cholelithiasis,* some helpful points can now be suggested. Of course, the recovery of gall-stones themselves is the *sine qua non* of this diagnosis. I have recovered small concretions through the duodenal tube in one instance, and on three other occasions have made stones pass either out of the gall-bladder or out of the duct, stones too large to be recovered by tube but found on sieving the stools. In none of these cases, however, do I feel that this would have happened at the time of diagnostic drainage if magnesium sulphate (locally introduced) did not possess the power to relax the sphincter and to control the gall-bladder wall. Why it loses much of its power to do so if first passed across the gastric mucosa, as Meltzer first noted and which I have confirmed, I am unable to explain, but such apparently is the case.

Next in importance to direct recovery of definite gall-stones, gall sand and a sense of grittiness to the finger suggests the calculus forming possibility. So does microscopical

finding of large agminated masses of precipitated crystals of bile salts or pigments, since it suggests that the liver cell has lost the power to hold these substances in solution as in the case of liver or hepatic duct stones, or that the bile in the gall-bladder has become so static that excessive concentration and crystallization have taken place. I have previously shown that the sudden dense turbidity that one sees taking place in an otherwise perfectly transparent bile during a drainage is due to a sudden spurt of acid gastric juice entering the duodenum and mixing with the bile. This was confusing at first and is still annoying. Dr. Bartle, working with me, found that this turbidity could be artificially produced in the case of very clear bile by artificially adding dilute hydrochloric acid. The turbidity varies according to the strength of the acid and the chemical constituents of the bile. Later on certain clear biles were encountered in which an *effervescence* as well as the turbidity was produced on adding HCl, similar to the reaction of acetic acid and calcium phosphates in the urine, and the question has been suggested as to whether this might mean the possibility of calcium phosphate stones, potential or formed, in the gall-bladder. More work must be done on this point.

Relative Atony of the Gall-Bladder is something I now believe we can diagnosticate and which I consider to be of extreme importance because I believe it to be one of the earlier phases of gall-bladder diseases and the forerunner of gall-stones and of gall-bladder infections. This diagnosis is suggested in three ways:

I. *The recovery of static or "off color" bile,* ranging from the deeper shades of golden yellow, into the green yellows, green black, and blacks, and possessing an increasing viscosity from that of a thick syrup to that of tar. Where the viscosity is heavy and the cytology shows much mucus and desquammating masses of bile-stained high columnar epithelium, and quantities of precipitated crystals I consider this an atonic *catarrhal* cholecystitis and a potential forerunner of calculi. I have seen this type alone as well as the type of *infected* cholecystitis with a swarming bacterial flora and pus, blood and inflammatory debris. This is the outspoken type giving rise to well marked clinical symptoms. But I have also frequently seen the "masked" infective cholecystitis with swarming bacteria and static bile, but no inflammatory reaction or marked cellular destruction. These are the cases that are *early,* do not show interpretable clinical symptoms, but give rise to the vague atypical dyspepsias, and these too are the cases which operatively are passed over as grossly normal, in which the appendix is removed but the "masked" focus left to breed pathology.

II. *In the amount of "static" bile recovered.* If a gall-bladder's normal capacity may be considered two and a half ounces, (the upper limit given by nearly every anatomist), and if four ounces of this type of bile can be recovered in bottles, (to say nothing of what may have escaped down the duodenum), it seems reasonable to assume that the gall-bladder in question must be functionally atonic and unable to move its contents promptly or the cystic or common ducts must be partially obstructed. If six to twelve or more ounces of this "static" bile is recoverable, (as in my series of cases), it must appear that the normal distensible sac has been overdistended, has become dilated and has perhaps ruptured some of its muscle fibres and may be progressing to an absolute atony. The functional type of relative atony seems to fit in well with many of the cases presenting symptoms of so-called "biliousness" and of cyclic migraine attacks. These, too, are groups that may be the forerunners of gall-stones and gall-bladder pathology, if the biliary tract is not emptied and kept draining freely.

III. *In normal cases when "B" bile is recovered it comes continuously until replaced by the appearance of "C" bile* and averages from one to three ounces and further "stimulation" with magnesium sulphate fails to recover any more. Whereas, in atony suspects "B" bile appears, the bile is static to varying degrees but gall-bladder discharge is intermittent, that is, two or three ounces of

"B" bile and then 10 to 30 c.c. of "C" bile and again two, three or four more ounces of "static" "B" bile. Furthermore it is possible to deliver more of this type bile on restimulating with magnesium sulphate. It is reasonable to suppose that such gall-bladder musculatures are deficient in tone and incapable of emptying completely. Of course, there are limits to the amounts of magnesium sulphate that should be used. I think a safe limit might be placed at 90 c.c. of 33 per cent representing 30 c.c. of the saturated solution. My custom is to start with 75 c.c. and note how much I recover in the first bottle unmixed with bile. If I recover about 40 c.c., I can then restimulate to the amount of 55 c.c. additional and still keep within the limit of 90 c.c.

It may be as well to mention here the fact that in many of these cases we are draining highly infected material from the biliary passages and that some of this fails to be aspirated into the bottles and is passing down the intestines to possibly infect susceptible zones lower down. There are two logical ways to overcome this. First, by douching the duodenum with various disinfecting solutions, potassium permanganate, silver nitrate, silvol or posslbiy chloramine-T, and get back what one can, (I personally do this, but do not advocate it for any one beginning duodenal work of this kind, for it has an element of risk because it is by no means certain that you get out again what you put in). Secondly, to hurry along the infective material as rapidly as possible through the intestines. To do this I always follow each biliary drainage, whether for diagnosis or treatment, with a duodenal enema. I prefer Ringer's solution, (for its healing qualities), reinforced by the addition of .5 per cent or .25 per cent sodium sulphate depending upon how much magnesium sulphate solution has failed to be recovered. The total amount of the duodenal enema I keep at 250 c.c., introduced at 105° F. and require at least twenty minutes for its introduction. This is usually effective in producing a large fluid or semifluid bowel movement in from 15 to 90 minutes. Furthermore, no patient leaves my office without being given a cup of bouillon and some crackers. This tides him over the faintness of hunger and free intestinal evacuation.

Diagnostic Inferences

I wish to refer now to the *diagnostic inferences* that might be possible *in the failure to obtain "B" or gall-bladder bile.* They are so obvious that they merely need tabulation.

It might indicate any of these possibilities:

I. Obstruction of cystic duct by,
 (*a*) Stone or stones.
 (*b*) Adhesions or angulations or structure.
 (*c*) Pressure from without; tumors, lymphatic glands.
 (*d*) Inspissated mucus—hydrops.
II. Gall-bladder contents may be entirely calculi and no, or relatively little bile.
III. Weakness of gall-bladder musculature —atony—dilatation—too weak to move its fluid contents.
IV. Tarry bile—ultra-static—too thick to flow.
V. Fibrosis of gall-bladder.

Treatment

This method during the past three years has been successfully used in the treatment of all of the states of *biliary diseases* mentioned in the following paragraphs. Three years is too short a time to predicate an opinion as to the ultimate possibilities this method of nonsurgical biliary drainage may possess. Its principles are soundly established *and are logical. Furthermore, one is able to gauge progress made by the improvement in direct objective findings in addition to the usual method of estimating clinical and* symptomatic improvement. The ultimate criterion of a "cure" in the real sense is more nearly within our grasp.

We are mechanically applying the surgical principles of free drainage for infected sacs, tubes and tissues, of free drainage for catarrhal states of inflammation of various grades but without infection, of free drainage for gall-bladders that are atonic, contain-

ing static bile that sooner or later develops stones or more serious pathology. While applying surgical principles we are treating nonsurgically and avoiding certain surgical risks. Cases suitable for this method of treatment must be selected. Its real sphere of usefulness lies in giving a direct method of treatment in *early* stages of disease, diagnosed early, before gross pathological changes have taken place. Removal of pathological tissue, of gall-stones, etc., must be left to the surgeon. Our aim should be to learn better to diagnose the beginnings of these diseases and to institute promptly direct, rational and safe measures of treatment. We may legitimately hope that this method, if intelligently applied, may decrease the number of cases requiring serious and dangerous surgery.

The *technique of treatment* is not difficult and can be carried out by hospital internes and even by nurses after a little practice. It does not require the expert supervision of the "highly trained specialist", although it is naturally better if such service can be secured. Here it differs at once from the necessity of procuring the most skillful full-time type of surgeon for surgery of the upper right quadrant of the abdomen. This is not the field for the occasional operator. To operate and have the patient live and to operate and make the patient well are two very different things. It is one thing to cut out pathological tissue and quite another to restore pathological physiology already existent, or that created by or increased by the operative procedure.

The technique of this treatment is easy but it is the skill in the general diagnosis and the technique of handling the minutiae of special diagnosis that requires the highly trained specialist, and the better his training in pathology and physiology and the keener his enthusiasm for the use of the microscope, the test- and culture-tube, the more valuable will be this opinion.

Simple *catarrhal jaundice* may be treated very satisfactorily by this method. The duration of jaundice in the ordinary case may be cut in half and potential damage to the ducts, gall-bladder and liver may be prevented. Recent papers[12] have shown what can be done in the treatment of this condition by this method.

Choledochitis and *cholangeitis* may be successfully treated in favorable cases, especially where they have not been preceded by surgery. That means the relatively early cases. Even in late cases where there has been well established pathology and several preceding operations this method may give an unexpectedly brilliant result. This was evidenced in one young girl whose case I have reported at length. She had three major and one minor gall-bladder and duct operations performed on her in three years with two further years of constant suffering and remittent exacerbations of choledochitis, finally culminating in a very severe and acute attack, with complete duct obstruction, chills, fever, sweats, high leucocytosis and toxaemia. Yet her condition, with its very serious aspects, responded splendidly to this method of attack and today that girl is well and has remained free from any further exacerbation for 3 years.

I have within the week seen a young woman of twenty-six who had her gall-bladder (with stones) removed 23 months ago; she had two weeks of surgical tube drainage and nearly four months of dressing drainage. She remained free from symptoms for just two months, when exacerbations recurred and during the past 18 months she has had an equal number of attacks of severe colicky pain which two weeks ago culminated in chills, fever and acute obstructive jaundice. Unless her duct can be speedily unplugged she is in a fair way to develop dilation of her ducts and *biliary cirrhosis* because her "safety valve", (the gall-bladder), has been removed. It is more difficult to unplug such a duct when the gall-bladder has been removed, because the contraction of the bladder supplies a good part of the *vis a tergo*. It is remarkable to what extent the gall-bladder can distend; for example take the case of the little girl at Johns Hopkins, recently reported, whose gall-bladder contained nearly a liter of bile.

What I have said of *choledochitis* applies to *cholecystitis,* perhaps, if anything, more favorably. Especially in the early cases, as those complicating typhoid fever, (*potential typhoid carriers*) and the *"masked" focal infections of the gall-bladder,* are the results good. This is the time to diagnose and to drain nonsurgically such cases and not to wait for the development of full-blown pathology.

Empyema of the gall-bladder has been successfully treated during its acute phases in patients who presented severe cardiorenal contraïndications for surgery. That is to say, they have been drained successfully, the maximum source of their toxaemia has been temporarily removed and they have been tided over to the point where corrective surgery for the removal of pathology could be more safely practiced. There is nothing to prevent the success of nonsurgical drainage in empyema provided the cystic duct is patulous. This is by no means recommended as the method of choice but as a possible alternative measure worthy of trial in selected cases presenting grave surgical contraïndications.

Cholelithiasis remains entirely beyond the scope of this method, although stones have been made to pass through the common duct. Our efforts should be directed to the detection and treatment of the early states of pathological physiology and to the prevention of calculi. The method has, however, distinct merit as a post-operative "follow up" treatment to prevent reformation of stones and to continue to drain, *ex corpore,* still infected bile beyond the limits afforded by surgical methods of drainage. This has been proved a successful measure.

The one field where this method can be strongly recommended is in the treatment of *"biliary stasis",* or faulty retention of gall-bladder bile. If more cases of "biliousness" are investigated by this method it will surprise many of you to find the gall-bladder atonic to varying degrees and unable to discharge its static bile. These are the cases which, if left to themselves and their cholagogues, are destined to develop a quarry of stones. These cases do extremely well. You see their improvement in color, digestion and bowel function. They lose their lethargy and recover their sense of well being. Many of these atonic gall-bladders are harboring pathogenic microörganisms but still preserve sufficient mucosal resistance to prevent infection of their walls. This is the time to treat them energetically by frequent drainage. Bacterial identification should be carefully made and autogenous vaccines have a very important place of usefulness. *It is very important to search back for primary foci of matched bacteriology in the teeth, tonsils, sinuses, bronchial tract, stomach or duodenum and remove them.* Many of these cases of biliary stasis are associated with various forms of migraine. Some of these cases respond almost miraculously to biliary drainage; others are very resistant, and suggest that an entirely different causative factor is present.

To sum up in a few words—this method has already achieved a position of importance in the diagnosis of biliary diseases. In the field of treatment it is certainly the method of choice for *"biliary stasis", gall-bladder atony,* and in the early states of catarrah and infection. It may be found to cut down the incidence of stone formation and thus of *cancer of the gall-bladder.* It may decrease the tendency to damage the pancreas and liver. It may have a place as an alternative method of treatment for some of the surgical groups presenting operative contraïndication. It certainly is useful as a post-surgical "follow up" plan of treatment in many cases.

A surgical critic has remarked, "It takes more than one swallow to make a summer", meaning that more time must elapse to prove its final evaluation. Quite true, but one must start somewhere. It has had a good beginning. It may go further. It is within my province to call your attention to it, and within yours to prove that it has the merit which I believe it to possess.

As to future development, it offers attractive possibilities for further direct clinical investigation into and interpretation of:

1. What are the cholagogues? How do they act?
 (*a*) By increasing liver secretion of bile or the velocity of its discharge?
 (*b*) Do they empty the gall bladder?
2. Precursory states and phases of gallstones and infections, i. e., biliary stasis, atony, etc.
3. Parallel studies on pancreatic secretion, velocity of elaboration of ferments and their discharge.
 What are the elective pancreatic secretogogues?
 Has it a place in the prevention of and treatment of diabetes?
4. Extending the scope of chemical investigations into the composition and physical properties of bile.

Here are many usefully important problems awaiting solution.

REFERENCES

1. Meltzer, S. J: Am. J. M. Sc., April, 1917, cliii, 469,
2. Lyon, B. B. Vincent: J. A. M. A., Sept. 27, 1919, lxxiii.
3. Deaver, J. B: J. A. M. A., April, 17, 1920, lxxiv.
4. Smithies, Frank: Northwest Medicine, February, 1920.
5. Lyon, B. B. Vincent: Ibid. cf. Ref. No. 2.
6. Lyon, B. B. Vincent: Am. J. Med. Sc., 159: 577, April, 1920.
7. Lyon, B. B. Vincent: Med. Clinics North America, March, 1920.
8. Lyon, B. B. Vincent: To appear (two installments) in Am. J. M. Sc.
9. Meltzer, S. J: Ibid.
10. Stockton, Chas. G: Practical Treatment by Musser and Kelly, iii, 498.
11. Smithies, Frank: Ibid.
12. Hopkins, A. G: Med. Clinics North America, March, 1920.
 Lyon, B. B. Vincent: cf. Ref. No. 6.

SYPHILIS OF THE COLON AND THE LOWER BOWEL WITH REPORT OF THREE CASES*

BY CLYDE F. KARSHNER, A.B., M.D., F.A.C.P.,

Instructor in Medicine, College of Medicine,
University of Illinois,

CHICAGO.

TO Fournier, may well be ascribed the position which Syphilis has come to assume in the mind of the modern physician. It was his steady insistence upon its prevalence and clinical importance which brought the profession to a realization of the truth of his contentions and a study of its manifestations.

Previous to 1912, when Arkin reported the first case in this country of acquired syphilitic ulcers of the small and large bowel—with exclusion of the rectum—and demonstrated the spirochete in the lesions, there was almost nothing written upon this subject on this side of the Atlantic. In fact, a collection of the literature by Arkin at the time of his report does not show a single reference in English. The condition, however, was recognized abroad.

In 1908 Keyes wrote that "syphilis of the rectum assumes so important a place in the mind of the general practitioner because of the insistence of Professor Fournier, rather than its frequency or clinical importance. Apart from the chancres and secondary lesions that may encroach upon the anus and the lower inch of the bowel we may recognize: (1) gumma—most exceptional and (2) ulcers,—very rare, usually confined to the ultimate inch or two of the bowel, sometimes associated with similar lesions higher up". Speaking of ano-rectal syphiloma, (which Keyes says is very rare, and of which he records but one case), he writes, "the lesion consists of a 'hyperplastic infiltration of the ano-rectal wall' (Fournier). The infiltration may be confined to the rectum, in which case it affects the region within or just above the internal sphincter. *It is never found higher* up in the bowel. It consists in a diffuse cylindrical rigidity of the rectal wall (a stricture) an inch or two in breadth, admitting the finger (perhaps with some difficulty), and not ulcerated upon its surface." Keyes ascribes a very small percentage of rectal strictures as being due to syphilis, but assigns the cause to "pelvic cellulitis, retroversion, trauma in parturition—all peculiar to women and bearing no relation to general syphilis".

Osler, in the earlier editions, and up to the 1918 printing of the eighth edition of his "Practice of Medicine" devotes fifteen lines to the entire subject of *Syphilis of the Digestive Tract.* This short discussion evidently forms the basis of statements made by many American writers in the discussion of the subject.

In recent years, as a result of a newer conception of syphilis and its relations, together with the use of more effective measures in its diagnosis and treatment, there has arisen a keener interest in gastro-intestinal syphilis. Conditions, the causes of which heretofore have been assigned to tuberculosis, carcinoma, sarcoma, non-specific ulcerations and

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various other conditions, are now proven to be due in a large percentage of instances to the manifestations of the *Treponema pallidum.* Some writers go so far as to greatly minimize the work of the *Bacillus of Koch* in the causation of stricture of the rectum and sigmoid, and the production of *fistula in ano* in a vast majority of instances. This state of confusion existing regarding luetic lesions of the colon is my excuse, if any be necessary, for offering the following three cases and submitting a brief discussion of the subject. The cases occurred in the clinical practice of Dr. Frank Smithies and myself.

CASE No. 1.—Patient male, age 41, married, American born; occupation—mercantile business. Referred to the clinic for examination. Family history is negative. Patient's wife, thirty years of age is living and well; two children, aged respectively three years and one year, are living and well; wife has had one miscarriage—her first pregnancy. Previous history is negative, except for gonorrhea twelve years ago and a questionable luetic history. Hemorrhoidectomy in 1905. The patient's chief complaint is bloody diarrhea of long standing.

Clinical History.—Eight years ago he began to notice alternating attacks of diarrhea and constipation. He would be well for several months at a time and then, due to no apparent cause he would develop a sudden diarrhea. He does not think that such happening was due to any error in diet. He has *no pain* other than a general abdominal distress which at times is quite severe on account of the large amount of gas in the bowel. The discomfort disappears immediately when gas is passed. Diarrhea free periods of eight or nine months were followed by abundant hemorrhage, much gas, pus and constipation or diarrhea. Stools have been very watery and contain mucus and blood. In the past year, he has had only one attack. The last attack began four months before coming under observation and diarrhea has been more or less constant ever since. *Weight is stationary,* appetite poor, has bad taste in the mouth, belches no gas, but passes a great deal per rectum. No ear, eye, nose or throat symptoms. No cardio-respiratory or nervous symptoms. His trouble has never kept him from work. His best weight was 165 lbs. eighteen years ago. For the last ten to fifteen years it has been around 150 to 152 lbs. A few years ago patient took a three month's sailing cruise and was well for 2½ years, then resumed work and a recurrence of diarrhea occurred. Patient has been treated recently at another clinic for amoebic enterocolitis.

Physical examination shows a nervous type of individual, moderately well nourished. Shins roughened, with a sallow pigmentation in the elbows and axillae. Left forearm is tattooed. Hair is rather scant in front. Temples prominent. Old fracture with good function in the right carpal joint. *Eyes* prominent, lids puffy with a trace of oedema, pupils equal. *Nose* negative. *Mouth*—teeth in excellent repair; tongue pale, fissured, rather raw looking: thin gray, foamy coat. *Throat* clean, except for a few fibrous tonsillar remnants. Lymph-nodes are palpable in posterior cervical chain and also in the groin. *Thorax—lungs,* negative. *Heart* in normal position, slightly enlarged to the left, 4¾ inches from midline. Area of splenic dulness slightly increased. There is much distension by gas in Traube's space, Litten's sign present on both sides. *Heart* sounds rather distant, but rhythm is good. Peripheral vessels soft. *Blood Pressure*—systolic 122, diastolic 64.

Abdomen rather full in the right upper. Inguinal rings rather wide. There is distension of the cecum, ascending and transverse colons, with considerable gurgling from gas and fluid, especially on the right side. Liver, kidney and spleen negative. There is slight spasm over the gall-bladder zone, but no definite tenderness; also a slight spasm over McBurney's point. *Rectum*—external, hemorrhoidal tags. Sphincter tight with evidence of healed posterior fissure. The finger cannot be introduced into the rectum to a greater distance than 1¾ inches from the anal ring on account of annular stricture. There is no blood on examining finger. *Genitalia* negative. *Reflexes* negative. *Ophthalmoscopic examination*—both retinae appear rather pale, with slight increase in marginal pigmentation, discs are moderately sclerosed.

Proctoscope could be passed but 2 inches. It met a firm, ring structure, the mucus membrane of which bled freely on slight trauma.

Laboratory Findings.—Urine, specific gravity 1025. Straw color, characteristic odor, clear, reaction acid. Very few epithelial cells, no blood, no pus. A few hyaline casts.

Blood, R. B. C. 4,800,000. W. B. C. 9,800. Hemoglobin 90 per cent. There are present a large number of blood platelets. Color, size and shape of red corpuscles normal. *Differential count,* small mononuclears 25 per cent; large mononuclears 3 per cent; transitionals 1 per cent; polynuclears 70 per cent; basophiles 1 per cent. *Blood Wassermann reaction; 2 plus on one examination, second examination a few days later, 3 plus.*

Stomach contents.—Chymification good. Mucus is present in moderate excess. No blood or bile found. Total acidity 38. Free HCl 20; combined 18.

Stool Examination.—General appearance bloody. Color,—reddish brown. Amount small. Consistency loose. Odor, foul. Mucus in large excess. Moderate amount of pus present and an excessive amount of blood. Reaction is alkaline. Guaiac test is positive. *Microscopical examination* shows considerable number of epithelial cells. Large quantities of pus and unaltered blood-cells, with excess amount of mucus, and presence of triple phosphate crystals. No protozoa (active or encysted) seen in numerous specimens studied.

Roentgen examination, by colon injection, shows an extensive stricture, beginning about 1¾ inches from the anal opening and extending upward throughout the sigmoid and for a considerable distance up the descending colon toward the splenic flexure. There is also present a stricture, clean cut in appearance, of the transverse colon, (evidently due to a gumma) which quite surrounds the bowel at the point of stricture. The wall of the descending colon and sigmoid shows a stiff, sclerosed appearance with entire absence of any peristaltic contractions. There is moderate dilatation of the transverse colon, proximal to the gummatous stricture, and the ascending colon and the cecum. (Figure 1).



Fig. I. Case 1. Roentgenogram showing luetic lesions of the colon before specific therapy had been instituted. (Joseph Johnston, roengenographer).

This patient was a difficult one to manage, owing partly to the stress of his business and partly to a lack of a realization on his part of the seriousness of his condition. The treatment in his case was therefore arduous. However, the result of antileutic treatment (salvarsan, iodides, and mercury intramuscularly) has been rather remarkable as shown by reference to Figure II, which plate was made about sixteen weeks following the institution of treatment. The gumma of the transverse colon has entirely disappeared, so far as its being a cause of stricture, and the descending colon and sigmoid now show a fairly adequate and regular lumen and more or less pronounced peristaltic contractions. The diarrhea has ceased; there has been no blood or pus visible in the stools for several months, and the patient has been able to attend fairly well to his business. He has gained 22 lbs. in weight and, physically, feels very "fit". He is still under treatment.



Fig. II. Case 1. Roentgenogram showing the colon after approximately sixteen weeks of specific treatment. At A there is disappearance of local strictures, loss of the ragged, ulcerated bowel contour, with replacement by smooth mucous membrane surface; at B appearance of peristaltic waves in section of gut, proximal to previous stenosis; at C entire disappearance of stenosing gumma; at D peristalsis appearing in the zone of previous dilatation. (Joseph Johnson, roentgenographer).

CASE No. 2.—Female, Age 39. Married. American born, housewife. Was referred to the clinic for examination and diagnosis, Jan. 22, 1920. Family history negative. *Personal History.*—health very good up till six years ago. Menstrual history—began at 14, regular, every 28 to 30 days. Was married at 26. No children, no pregnancies. (?) Had measles, mumps and whooping-cough in childhood. Denies both syphilis and gonorrhea. Has had seven former abdominal operations for "tuberculosis of the bowel". Chief complaint is diarrhea.

Clinical History.—About six years ago, following an abscess of the vulva, she began to have pains about the rectum. She consulted a physician who diagnosed hemorrhoids, for which she underwent an operation. The result was unsatisfactory and six months later she was in the hospital again for the same condition and was operated on for the second time. Then it seemed she was in the hospital every six or seven months until two years ago. Each time some operation was done. She had the last abdominal section, August, 1919. Menstruation stopped about a year ago, since which time she has had hemorrhage from the bowel of either red or black blood about each time her period is due. At times she has a chill—sometimes brought on by a drink of cold water—which is followed by a fever. Has a great deal of gas both in the stomach and bowel, especially the former. Belches a great deal at all times without relation to meals. Cannot take sweets because they make the bowel condition worse. Sometimes she cannot even wait to finish a meal. She has had a few night sweats, for a

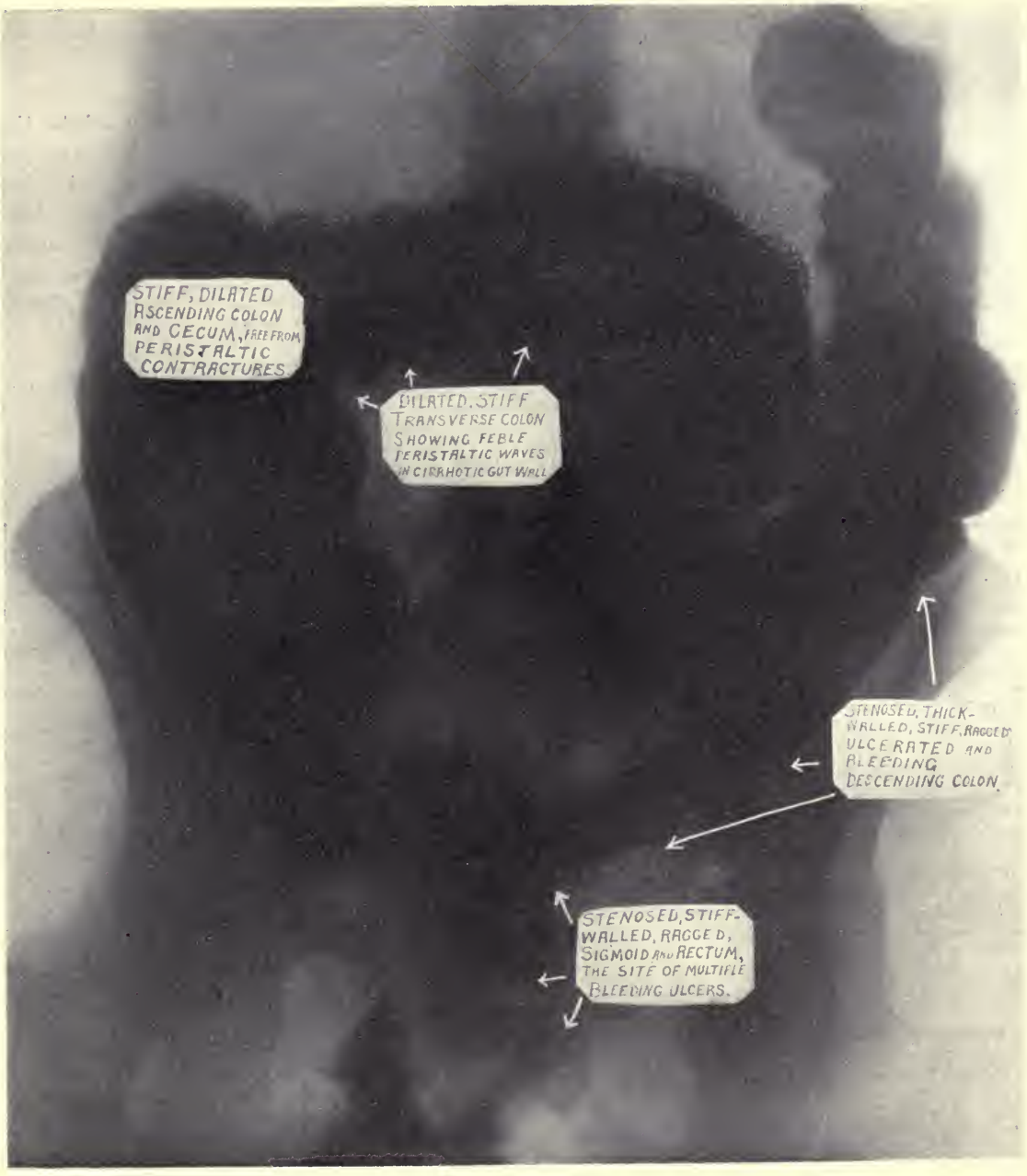


Fig. III. Case 2. Röentgenogram of colon, with sites of luctic lesions indicated. (Joseph Johnson, roentgenographer).

short period of about ten days. This was about a month ago. Becomes very weak on exertion. Has no cough; no eye, ear, nose, or throat symptoms. There is no swelling of feet or eyelids and no bladder symptoms. Her best *weight* seven years ago was 140 to 142 lbs. Present weight 112 lbs. Sleeps poorly. Her appetite is poor, has little real desire for food. Complains of her heart throbbing and says it "jumps", when she first lies down or when she is nervous. Has been worrying considerably about her condition. *Pulse* 130. *Respiration* 26. *Temperature* 97 3-10 (Noon).

Physical examination shows a highly nervous woman; restless type, but in fair nourishment. Shins are rough. There is no oedema. Chilblain type of circulation in the extremities. Skin is of fair color. Hair negative; face flushed. *Eyes* negative. *Nose*—there is a suggestion of saddle nose, and herpes of right nostril, otherwise negative. *Mouth*—lips are dry, gums are infected; there is considerable pus about the lower gum margins; much artificial work in mouth. Tongue is dry and has a grayish granular coat. *Throat*, ragged tonsil remnants, which are infected on both sides. Thyroid is atrophic. *Lymphnodes* are negative throughout. *Thorax* moderately well formed,

breathing superficial. There is deficient expansion in the left upper with rather sluggish filling on deep inspiration. The liver dulness begins at the fifth rib, is 5½ fingers in extent. *Spleen* negative. *Lungs*—there is a peculiar puffiness of the apices on both sides. The right apex is retracted with slightly diminished resonance extending to the second rib. Negative otherwise. *Back*—there is atrophy of the skeletal muscles of the right upper thorax. *Spine* negative. Right apex is retracted; there is poor resonance over both, diminished resonance over the left lower, extending rather higher than on right. There are fine inspiratory and expiratory rales, on the right above the scapula. Increased whispered voice over the left upper. Increased spoken voice over the right upper. *Heart*—weak muscle tone, with an increase in rate. There is a blowing systolic murmur over the pulmonic area, negative otherwise. Peripheral vessels are negative. Blood-pressure 118-58.

Abdomen.—Scar of low median incisions, with separated recti and suggestion of hernia, but without deep adhesions. The abdomen is uniformly distended, has a peculiar doughy feel, no visible peristalsis. The sigmoid and descending colon are well filled, thickened and palpable. Liver, kidney and spleen negative. There is muscle spasm over the right rectus muscle in the theoretic location of the cecum and terminal ileum. There is no ascites. *Vaginal*—cystocele present. Cervix is 1¼ inches inside the vulva. There is a bilateral laceration of the cervix; bladder is negative. Adnexa can be moved slightly. There is tenderness on upward pressure on the cervix. Examining finger is negative. No blood, no pus. *Rectal*—external hemorrhoids. The sphincter has been cut, with resulting adhesion low down making a partial stenosis inside the true sphincter. Bowel wall much thickened, stiffened and rough. *Reflexes* present but slow. *Ophthalmoscopic.*—There is considerable oedma in both fundi with slight choked discs.

Proctoscopic examination not permitted.

Laboratory Findings.—Blood—R.B.C. 4,440,000. W.B.C. 10,800. Hemoglobin 85 per cent. *Differential count*—small mononuclears 10 per cent, large mononuclears 20 per cent, polynuclears 65 per cent, eosinophiles 5 per cent. *Blood Wassermann, two plus.*

Urine.—Specific gravity 1025. Reaction acid. Color straw. Very few pus cells were observed but no casts, sugar or blood. No albumin.

Stomach Contents.—Chymification fair. Odor characteristic. Total quantity recovered 40 c.c. There is present considerable mucus. Total acidity 14. Free HCl 10. There are large numbers of staphylococci present, but no Oppler-Boas bacilli, yeasts, sarcines, or blood-cells.

Stool Examination.—Amount 15 grams. Consistency loose, color reddish-brown. Blood is present to the unaided eye in considerable amount. Reaction is alkaline; there are some epithelial cells present, no pus, but a large number of red cells, upon microscopic examination. No Kock bacilli, or protozoa—active or encysted.

Roentgenological Examination.—Head—clouded antra on both sides. *Stereo of lungs* shows an old pleural fibrosis on both sides. The *colon* plates show a thickening of the wall of the distal part of the descending colon and the entire sigmoid, extending well into the rectum. The appearance is that of marked stiffening and irregularity due to a fibrosis. Normal peristaltic contractions are absent and there is noticeable narrowing of the lumen of the bowel. (See Figure 3).

This patient was given 5 mils of old tuberculin subcutaneously. She gave no local, focal nor constitutional reaction to the test.

The patient was advised to go into the hospital for anti-luetic treatment, but declined, seemingly because she dreaded being considered a syphilitic patient. Her husband, seen later, admitted having a chancre when a young man. His *glans penis* showed a punched out scar, and his inguinal glands had been incised for "blue balls".

CASE No. 3.—Age 37. Male, single, Swedish birth. Occupation—laborer. Entered clinic, April 24th, 1920, for "stomach and bowel trouble."

Father and mother both living and well. Four brothers and two sisters living and well. No cancer, tuberculosis or nervous diseases in the family. Uses little coffee, no tea or alcohol or snuff; smokes about five cigars a day and chews tobacco. Has had grippe, tonsillitis and pleurisy (several times); *admits both luetic and gonorrheal infections;* tuberculosis and malaria questionable. Twenty years ago had an accident in which his eyes were severely burned with powder. Appendix was removed fourteen years ago. Has been operated on for hemorrhoids and fistula in ano.

Clinical History.—Patient says he has had "stomach trouble" ever since he can remember, which is manifested mainly by an intolerance toward all kinds of solid food. During the last four or five months the symptoms have been getting worse. Is unable to eat anything but liquids. Says that solid food sours in his stomach and causes pain. This occurs generally about an hour after feeding; it is "dull" and "aching" in character, and throughout the epigastrium it becomes very sharp at times. There is a great deal of gas present during these attacks, which is mainly passed by bowel. Has attacks of nausea and vomiting, relief being experienced when stomach becomes empty. The vomited matter contains a great deal of bile, but never any blood. Patient believes that he has had two or three attacks of icterus, and several attacks of diarrhea without, however, passing any macroscopic blood. Usually the bowels move about three times daily, the movements being soft or liquid, of a yellowish color, and bad odor, but with no visible blood. He states that his abdomen throughout is quite tender. Appetite very poor, sleep good. He has lost about thirty pounds during the last four months, his present weight being 117¼ pounds, chiefly because he has eaten little food. He has no oedema, no dyspnoea, but has a slight dry cough with a small amount of mucoid expectoration. Thinks he has a slight afternoon temperature, and thinks that he may have had night sweats some time ago when much "rundown". He has often had trouble in the chest similar to the pains of pleurisy ("Neuritis"). Urination is difficult at times. *Pulse* 108. *Respiration* 25. *Temperature* 95, at 10.30 A. M.

Physical Examination.—Shows a male of slender frame, markedly undernourished and with chilblain type of circulation in the extremities. Very little panniculus, small muscles, which are very soft. Hair scant. Small pock-like marks over forehead and face. There is the scar of an old injury of the left eye, probably due to the powder explo-

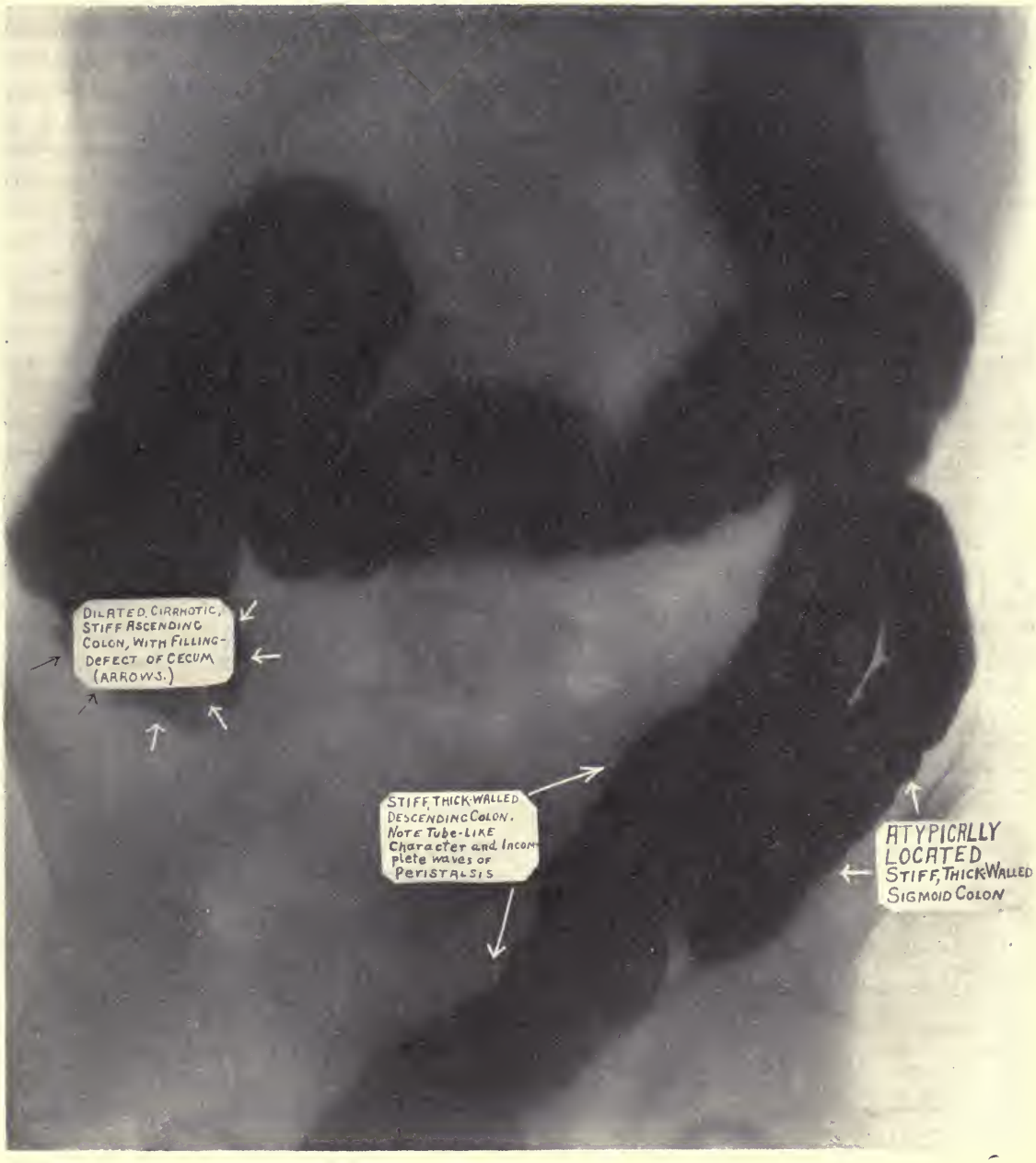


Fig. IV. Case 3. Roentgenogram of the colon, with sites of luetic lesions indicated. (Joseph Johnson, roentgenographer.)

sion above mentioned. Eyes are negative except for irregularity of the pupil of the left eye. There is marked left nasal obstruction. *Mouth.*—There is one loose tooth in the lower jaw, with badly infected gums: very red, irritated and swollen. There is considerable dental work in upper jaw. *Tongue* is large, papillae are atrophic; it is clean, pale, tremulous. There are small buried infected tonsils. *Thyroid* atrophic. *Lymphnodes* are palpable in the left anterior cervical chain, in the axillae and in both groins.

Thorax is long, deep, narrow, ribs very prominent, expansion good and symmetric. *Liver* is enlarged, (dulness is six fingers in breadth in the midclavicular line). *Spleen* dulness enlarged, extending to the 7th rib. *Lungs* are clear, except for rather harsh breathing throughout. *Heart* is not enlarged. Apex beat four inches from the midline. Muscle sound is distant and muffled; the first apical sound is roughened, there is an accentuated pulmonic second sound. There is slight, simple arrhythmia. Peripheral vessels, moderately sclerosed. *Blood-pressure*, systolic 82, diastolic 52.

Abdomen flat. Old appendicectomy scar, fairly well healed. There is moderate distention of cecum and the transverse and descending colons. Liver

is not palpable; kidneys and spleen negative. There is pronounced tenderness and muscle spasm in the theoretic gall-bladder zone, extending towards the duodenum. *Stomach* is not enlarged. There is tenderness over the bowel generally, particularly over the regions of the terminal ileum and the cecum. *Rectum*—old hemorrhoids, sphincter tight; healed posterior oval fissure with scar. There is sacculation of anterior rectal wall and a tunnel-like cavity, admitting an inch of the fore-finger, passing forward under the prostate. The rectal valves are very stiff, thick and sclerotic and there seems to be accumulation of much scar tissue along the anterior rectal wall. This is rough, gristle-like, hard and firmly fixes the rectum. *Genitalia*—freckle-like discoloration over the glans, otherwise negative. Reflexes somewhat sluggish. *Ophthalmoscopic* negative, except for some scars in the sclera.

Proctoscope discloses a pale, sclerosed, roughened and adherent rectal wall, pitted with irregular, healed ulcers. The bowel wall was so stiff and adherent that it was not possible to straighten it out on the proctoscope and thus admit of the instrument's being passed up into the sigmoid.

Laboratory Findings.—Blood, R.B.C. 3,660,000; W.B.C. 5,600. Hemoglobin 80 per cent. The color of the red blood-cells is pale; they are irregular in size and shape. There are a few poikilocytes with the presence of both macrocytes and microcytes. *Differential count* returns small mononuclears 31 per cent, large mononuclears 9 per cent, polynuclears 59 per cent and eosinophiles 1 per cent. *Blood Wassermann 2 plus* first examination; 4 plus after .3 gram neo-arsphenamin.

Urine, dark straw in color, cloudy. Specific gravity 1021. Reaction acid. Tests for albumin and sugar negative. There were some squamous epithelial cells and a great many urate crystals, but no casts.

Stomach contents—chymification poor, 35 c.c. recovered which showed a total acidity of 13 and an entire absence of free HCl, otherwise negative.

Roentgenologic.—Head: chronic nasal obstruction, infected teeth roots. Thorax: a weak flabby heart. Alimentary tract: the duodenum is held firmly up in the region of the gall-bladder, evidently by adhesions. Oesophagus, stomach, jejunum and ileum negative.

Colon plate showed a fibroid stenosis of the transverse colon (gumma?), together with thickening and fibrosis of the descending colon, sigmoid and rectum. There is an entire absence of peristaltic waves throughout entire affected portion of the bowel (Fig. 4).

Stool examination.—Color, greenish-brown; consistency, pasty. No blood visible to the eye. Microscopically, some altered blood-cells, pus and mucus; chemically, markedly positive test for blood by the benzidin test. *No protozoa were seen.*

Tuberculin Tests.—5 mgm. of "old" tuberculin, administered subcutaneously resulted in no constitutional, focal or local reaction.

This patient entered the hospital May 20th, 1920. Anti-leutic treatment was inaugurated at once. He is still under observation, progressing satisfactorily.

Discussion

Warthin states that it is a very unfortunate fact that syphilis is even yet generally regarded by physicians as a dermatological affection. This occurs because the patient who has passed through the experience of chancre, graduated from the secondary class, and passed on into the latent stage may appear many years afterward in some other clinic with no dermatologic or neurologic upset. He may come to the internist with aortitis, myocarditis, or angina pectoris; to the proctologist with stricture of the rectum, ulcerative colitis, or fistula in ano; or to the gastroenterologist for vague and indefinite symptoms referable to the oesophagus, the stomach, or the intestines. Syphilis can no longer be regarded as a local disease, particularly a local skin disease. It attacks the tissues generally, and, seemingly, indiscriminatingly, producing wide-spread fibrosis throughout all the organs and so pronounced a hardening or toughening of the tissues as can be readily recognized by the trained pathologist at autopsy even on the first stroke of the knife, provided lues be ever borne in mind. "Latent syphilis is an internal disease"; it may remain "latent" for years.

The pathological manifestations of syphilis in the colon and rectum are varied. They are chiefly: (A) Primary lesions which are, of course, rare from the very nature of the disease and the manner of its dissemination. (B) Secondary lesions; as mucus patches; these are said to be rare, but there are clinicians (Tuttle and Earle) who believe them to be much more common than is generally supposed. Mucus membranes are readily attacked at this stage and it may be that systematic examination of the rectum and the sigmoid in an extensive series of cases, presenting mouth and throat lesions, would give interesting data in this regard. Similarly, examination of the bladder with the cystoscope, in such a series, might also yield useful facts in a hitherto entirely neglected field. At this stage, local, subjective symptoms are practically absent and thus they often escape notice. (C) Ulceration of the rectum and sigmoid is often observed. Sometimes these are simple abrasions; again crater-like ulcers involving the layers of the bowel to a slight or marked degree, and often

producing extensive destruction of tissue or even actual perforation of the gut. These ulcers may be single or multiple. If the latter, they are generally in groups of two or three. Such ulcers are usually the results of broken-down multiple gummata. They have a tendency to follow the course of the lymph- and blood-vessels and thus be in lengthwise direction along the bowel wall. It is this peculiar arrangement which causes the characteristic pathological changes observed in cases of syphilis of the bowel of long standing. Even at this late stage, the patient may have but few symptoms of a subjective nature, because late syphilitic lesions are not, as a rule, painful. The symptomatology varies greatly in location and degree as breaking down, healing and contraction of scar tissue take place. Frequently, the patient appears with symptoms of an atypic dysentery in a very acute form, or he may suffer from a condition resembling a chronic, recurrent amoebic or bacillary type of bowel infection. Tuberculosis and even malignant disease of the colon or the rectum are commonly given as diagnoses for the extensive, persistent instances of colon syphilis.

In hereditary lues of the colon, the pathologic picture is generally different from that of the acquired form. In the former (Levison) the mucosa or serosa is affected by an intense hyperemia and nuclear proliferation; or the process may be less acute or even chronic, with cloudy swelling or membrane formation, either a fibrinous or purulent exudate—and with resultant adhesions. In the *acquired form* more often are found the true gummata or syphilomata. These occur as multiple, miliary tumors which may remain discrete, or coalesce to form large nodular masses, sometimes resembling carcinomata and often mistaken for such. A gumma begins as a proliferation of arterial endothelium, producing occlusion of the lumen and consequent diminution of the blood supply. The endothelial cells may or may not fuse to form the so-called "giant-cells". About such there is a proliferation of fibrous, connective-tissue, which is furnished with a better blood supply and forms the so-called "intermediate zone". Then follows an outer zone. This is vascular and marked by an infiltration of plasma-cells and lymphocytes. This merges gradually into the surrounding tissue. The breaking down of such lesion in the wall of the bowel leads to ulceration. The infection which follows secondarily from bowel contents, adds confusion to the picture. Such ulcers are often mistaken for carcinomata, but the bowel wall is stiff, rough and leathery to the examining finger, and lacks the necrosing, nodular characteristics so common to neoplasms. In fact, it is this stiff, thickened, and leathery condition, without gummatous formation, that so often escapes recognition by the physician. We believe that this type of case (diffuse fibrosis) is more often met with in general practice than is the gummatous, though the two conditions are usually associated if the case is of long standing. Carrera states that "from the work of Warthin the *gumma is a relatively rare lesion of (visceral?) syphilis,* and that the *essential pathology of syphilis,* as it affects the central nervous system, heart, aorta, liver, pancreas, adrenals, testes, and other organs, *is a mild, inflammatory process characterized by lymphocyte and plasma-cell infiltrations, leading eventually to fibrosis and atrophy.*" Virchow, as long ago as 1858, classified syphilitic cases as either irritative or gummatous, and Warthin states, "later this was forgotten, and the gumma was looked upon as the central, characteristic lesion of syphilis".

Ulceration of the bowel may result in stricture in one of the following ways, according to Arkin:

(1) By the formation of a ring-like ulcer, (2) by scar formation without ulceration, (3) by scar formation about an ulcer, or (4) by shrinkage of the center of an ulcer. Our experience, as demonstrated by the cases herewith presented, bears out Arkin's observations.

Diagnosis.—The differential diagnosis of syphilis of the bowel must be made from malignant disease. This is not generally difficult. Chronicity is the main feature to be

relied upon, though the absence of severe pain, the positive Wassermann, the lack of the extreme cachexia and the fair general condition are all useful differentiating points. The diffuseness of the lesion, as shown by *x*-ray, and the tendency to fibrosis usually clinch the diagnosis.

Syphilis and Tuberculosis.—The real difficulty is met with in differentiating syphilis and tuberculosis. Among proctologists, who necessarily see a much larger number of cases of stricture of the bowel, ulcerative colitis, proctatitis, and fistula in ano, than does the general practitioner, there is coming to be quite a wide-spread inclination to minimize the incidence of tuberculosis, and to ascribe the leading cause of most of these ailments to the effects of the pale Spirochaete. Linthicum says, "I do not believe that, aside from the very rare obstruction produced by that condition known as hyperplastic tuberculosis, the individuals who have tuberculous ulcerations with all the debilitating conditions associated, ever live long enough to develop stricture, nor in all the tuberculous cases (which he mentions he has seen in Tuberculosis Hospitals), early and advanced, has it been my good or bad fortune to see one; and I believe that when such cases have been reported, the possibility of an additional syphilitic infection was overlooked, as the two are not incompatible. It is my solemn belief, that, with the rare exceptions of injury, cancer, hyperplastic tuberculosis, practically all strictures (of the lower bowel?) are syphilitic in origin.

"It has not been well recognized that the mucosa of the bowel is susceptible to secondary lesions as are other parts of the body. Lang, of Innsbruck, examined forty-five men and sixty-five women in the eruptive stage of syphilis to determine the presence of secondary lesions in the rectum. He found such present in sixteen cases. They usually involved the posterior wall, occasionally laterally, but, in three cases, the whole circumference of the bowel. The symptoms were very slight and only in three instances were there pain on defecation, or loss of blood. It is probable that the vast majority of these cases get well without ever having had knowledge of the condition. However, it is also probable, that lesions of the type mentioned by Lang, may have been the beginnings of later pathology, ulcerations or conditions leading to the formation of strictures". Much of Linthicum's report will bear repeating in this connection. He quotes from Sloan's records (Maryland Hospital for Consumptives) covering six years, in which, from 1193 cases of phthisis there were found but sixteen cases of fistula. Some of these were diagnosed from the history alone; fourteen patients were in the final stages of tuberculosis.

Other reports show fistulae only in from two to five per cent of tuberculous cases. Many believe and teach, however, that fistulae are frequently the primary manifestation of tuberculosis, remaining localized for a long time. This is not in harmony with postmortem reports either of adults or children. In the Charite Hospital of Berlin, out of 3,104 autopsies of instances of tuberculosis in children, there were only sixteen cases of primary, intestinal tuberculosis. However, tuberculous ulceration, secondary to long involvement, was frequent. Such was found in 566 of 1,000 autopsies. The records show that the bowel involvement began in the ileum, colon or cecum and progressed *downward not upward.* The solitary lymph follicles showed the beginnings of the affection, most commonly. In 1,000 autopsies on adults, in the Munich Pathological Museum, there is but one case of primary, intestinal tuberculosis. Primary tuberculous involvement of the intestines is thus shown to be exceedingly rare. When such occurs it is practically always in children. But intestinal tuberculosis does occur, *secondarily to pulmonary tuberculosis,* in more than 50% of tuberculosis deaths, as shown at autopsy. Then the ulcerations are high up in the bowel and but rarely occur as *fistulae* in *ano* or as rectal or sigmoid lesions. The highest percentage of tuberculous anal lesions claimed by any authority where the pulmonary lesion is primary, is only about 5%. It is also stated that practically all anal fistulae origi-

nate as abscesses, which for various reasons do not heal completely. In many instances the cause can be determined, as injury, with subsequent pus infection, a lesion secondary to a tuberculous infection, or even infection by the gonnococcus. There is, however, always a number of cases remaining to which initial cause cannot be discovered. In fistulae occuring in the recto-anal canal, (sometimes incomplete, more often complete), and usually of long duration, because they are difficult to heal in spite of most careful dissection, it is believed that syphilis will be found to be the predominant etiologic agent.

Chronicity is a marked characteristic of the visceral ulcers of so-called "latent" *syphilis*. In a series of 19 cases of ulcer and fistulae collected by Linthicum, four only were tuberculous. These were associated with lung involvement and the Wassermann tests were negative. One was traumatic, due to foreign body, and there was a negative Wassermann test. Twelve gave positive Wassermanns, and of three, the cause could not be determined. Upon these, anti-syphilitic treatment had apparently no beneficial effect. Linthicum believes that it is a common occurrence to have a minute gumma break down in the submucosa and contiguous tissues, thereby forming an extensive indolent abscess which ultimately becomes a fistula.

Obscure hemorrhage from the bowel often diagnosed as simple ulceration, and not uncommonly operated upon for "internal" hemorrhoids, without relief, often yields to anti-syphilitic treatment. Matthews and Hanes both agree that syphilis is responsible for most of the strictures of the rectum. A case from the Maryland General Hospital reports is instructive: a woman had five distinct strictures of the bowel, at as many different points, two of which were ulcerated and three were not; they resisted all attempts to heal them until vigorous specific therapy was exhibited. They then healed promptly. It would seem, therefore, that ulceration is not a distinctive diagnostic point in the differentiation of syphilitic and non-syphilitic cases. As in syphilis of other parts of the body, a positive Wassermann may be taken as proof of syphilis, while negative reaction in the presence of history and existing characteristic pathology is of no clinical significance.

Treatment of Syphilis of the Bowel is largely individual for the case in hand and is to be adjusted to the pathology revealed. Anti-syphilitic measures are, of course, primary. Salvarsan, iodides and mercury are to be pushed to the point of tolerance, provided there are no contra-indications. Following this, dietetic regimes must be instituted so as not to overload or irritate a strictured or an ulcerated colon. Local applications to ulcerated surfaces may be indicated in certain cases, while, in advanced fibrosis with bowel stricture practically complete, it may be necessary to sever the stricture, resect the affected portion or perform a colostomy. Werneck mentions the cure of a syphilitic ulcer of the posterior wall of the rectum by operative procedure. An iliac anus was provided and the extensive, fibrosed lesion resected. There was speedy and complete cure, the natural anus later functioning perfectly. In this case, medical measures had been of no benefit—there was a negative blood Wassermann. Microscopical study of extirpated tissue showed merely an indolent, inflammatory process.

The results of treatment cannot be forecast in any given case. Those with most widespread and involved pathology may respond speedily to treatment (see Case 1), while others, with far less extensive pathological changes, may require the radical measures, both medical and surgical. Treatment resolves itself into intelligent management of the individual case, guided by a correct estimate of the location and extent of the pathology present and by frequent observations of the affected bowel, roentgenologically and through the proctoscope. Undoubtedly, however, the early recognition of the condition must influence in a larger measure the results of treatment. This is something that is up to the physician; where atypic bowel conditions are present, they must be considered luetic till proved not. We further believe that these cases will be recog-

nized earlier only by more thorough methods of history-taking, physical, roentgenologic and proctoscopic examinations, together with the more general adoption of the true conception of syphilis, i. e., that syphilis is an internal disease. When the possibility of the visceral lesions of lues being more common than text-books indicate is borne in mind, more instances of its clinical occurrence will be recorded and many "obscure" digestive ailments will be alleviated or cured by the exhibition of appropriate therapy.

1002 N. Dearborn St.

BIBLIOGRAPHY

1. Adler, L. H: Syphilis of the Ano-rectal Region.
 N. Y. Med. Jour., 1911, xciv, 823-825.
2. Arkin, A: Acquired Syphilitic Ulcers of the Bowel; Demonstration of Spirochaete Pallida.
 Tr. Chicago Path. Soc., 1911-12, viii, 224-240.
3. Asman, B: Syphilitic Stricture of the Rectum.
 Internat. Clin., Phila., 1910, xx, Sec. 3, 225-231.
4. Baldwin, A: Case of Gumma of Rectum Simulating Carcinoma.
 Proc. Roy. Soc. Med., London, 1915-16, ix, Surg. Sec., Sub. Sec., Proctol. 29.
5. Barker, L. F: The Importance of a Knowledge of Syphilis, and Especially of Visceral Syphilis, for General Medical Diagnosis.
 Am. Jour. Syph., St. Louis, 1917, l, 149-178.
6. Billings, F: Visceral Syphilis. J.A.M.A., 1911, lvii, 1653-1656.
7. Boehm, J. L: Treatment of Rectal Syphilis with Salvarsan (606).
 Proctol, St. Louis, 1911, v, 71-74.
8. Brown, Thos. R. & Gaither, E. H: Some Notes on Syphilis of the Digestive Tract.
 Am. Jour. Syph., St. Louis, 1919, iii, 376-383.
9. Buswell, H. C: Gastro-intestinal Manifestations of Syphilis.
 New York State Med. Jour., 1916, xvi, 12.
10. Chassaignac, C: Syphilitic Affections of the Anus and Rectum.
 American Jour. Derm. & Gen.-Urin. Dis., St. Louis, 1906, x, 263-265.
11. de Quervain, F: Clinical Surgical Diagnosis (Wm. Wood & Co.), N. Y., 1917, 362 & 374.
12. Drueck, C. J: Syphilitic Evidences in the Rectum.
 Ill. Med. Jour., Springfield, 1911, xix, 490-494.
13. Drueck, C. J: Late Syphilis of the Rectum.
 Am. Jour. Syph., St. Louis, 1902, iv, 91-96.
14. Frankenburger, J. M: Syphilis of the Rectum.
 Interstate Med. Jour., St. Louis, 1913, xx, 1045-1048.
15. Graham, A. B: Perirectal Gumma, Report of Two Cases.
 Proctol, St. Louis, 1914, viii, 270-274.
16. Graham: Trans. Am. Proctol. Soc., St. Louis, 1914, xvi, 119-123.
17. Haller, D. A. & Walker, I. C; Two Cases of Probable Syphilis of the Intestines.
 Am. Jour. Med. Sci., Phila., 1917, clii, 824-833.
18. Jelks, J. L: Ano-Rectal Manifestations of Syphilis.
 Am. Jour. Derm. & Gen.-Urin. Dis., St. Louis, 1906, x, 363-366.
19. Johnson, A. B: Surgical Diagnosis (Appleton, N. Y.), 1909, ii, 229-230.
20. Jost, W. E., and Gradwohl, R. B. H: Primary Syphilis of the Rectum, Report of a Case.
 New York Medical Journal, 1916, civ, 893.
21. Keyes, E. L., Jr: Syphilis (Appleton, N. Y.), 1908.
22. Levison, L. A: The Acute Abdominal Manifestations of Syphilis.
 Lancet-Clinic, Cincin., 1911, cv, 436-443.
23. Linthicum, G. M: Syphilis of the Rectum.
 Proctologist, St. Louis, 1916, x, 225-263.
 Trans. Am. Proc. Soc., St. Louis, 1916, xviii, 117-125.
24. McCaskey, G. W: The Incidence, Diagnosis and Treatment of Visceral Syphilis.
 Jour. Ind. St. Med. Assn., Ft. Wayne, 1917, x, 51.
25. Osler, Sir. Wm. & Churchman, J. W: Syphilis, Mod. Med. (Osler & McCrae).
 Phila. & N. Y., 1914, ii, 144-215.
26. Simon, S. K: Syphilis of the Stomach and Intestines.
 Southern Med. Jour., Birmingham, 1918, xi, 280-288.
27. Smithies, Frank: Syphilis of the Stomach.
 American Journal of Syphilis, 1917, 1, 100.
28. Warthin, A. S: Visceral Lesions in Latent Syphilis.
 Mississippi Valley Medical Journal, Louisville, 1917, xxiv, 122-134.
 New York Medical Journal, 1918, cvii, 71.
29. Werneck, C: Operative Cure of Syphiloma of the Rectum.
 Brazil-Medico, Rio-de-Janeiro, 1916, xx, 153-160.

OEDEMA OF THE HEART-MUSCLE AS A CAUSE OF CARDIAC ENLARGEMENT*

BY ANDERS FRICK, A.B., M.D., F.A.C.P.,

Chief of the Division of Internal Medicine,
Augustana Hospital,

CHICAGO.

PATHOLOGISTS are well aware of the occurrence of an oedema of the heart muscle; a "Stauungsherz", a "coeur cardiaque". A few clinicians have furthermore called attention to the importance of this condition. Nevertheless, very little has been said about oedema of the heart as a factor in cardiac enlargement, as a cause of cardiac malfunction, as regards its differential diagnosis, *intra vitam,* from cardiac dilatation and cardiac hypertrophy, or as to such oedema furnishing definite indications for therapeutic measures. These are all questions of considerable importance.

Significance of Roentgen Observations Made Serially upon Heart Size and Form.—In cases of cardiac disease, if roentgenograms of the chest are taken while the patient is in a state of cardiac incompensation, during the period of treatment and after compensation has been restored, it will be be found that the degree of diminution of the cardiac shadow is dependent chiefly upon two factors:

(1) *The length of time which the state of incompensation (or rather, of cardiac failure) has lasted.* Assuming that this is equivalent to the preceding period of cardiac dyspnoea, one may say that the longer the patient has complained of dyspnoea on exertion the less the cardiac shadow will diminish while compensation is being restored and *vice versa.*

(2) *The amount of hydrops eliminated chiefly by increased diuresis;* or, in other words, the more profuse the diuresis is, and the greater the consequent loss of weight by the patient is, while compensation is being restored, the more marked will be the diminution in size of the cardiac shadow shown roentgenographically. It is our opinion, that not sufficient attention, clinically, has been given these facts, or, if these phenomena have been recognized, their importance with regard to therapy has not been fully appreciated.

To substantiate these views and to furnish corroborative evidence of the significance of the above observations, reports of typical cases are offered.

CASE 1.—Wm. L., 58. Dyspnoea 12 years, attacks of cardiac asthma 8 months, anasarca four months. *Admitted* to hospital February 24, 1916. Severe dyspnoea, engorged jugular veins, irregular heart-action, systolic, apical murmur; moist râles over lungs, large liver; albuminuria 1 per liter; anasarca to hips; weight 190 lbs.

Roentgen Examination.—Horizontal diameter of cardiac shadow 22.5 cm. on admission. Patient *discharged* March 31, 1916 in good condition: weight 170 lbs.; horizontal diameter of cardiac shadow 20.4 cm. As hydrops disappeared through profuse diure-

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Fig. 1a. Wm. L. Roentgenogram taken Feb. 24, 1916.

sis, the patient lost 20 lbs. in weight. *The horizontal diameter of the cardiac shadow, demonstrated roentgenographically, diminished 2.1 cm.*

Case 2.—Andrew D., 60. Dyspnoea 5 years; attacks of cardiac asthma 6 months; anasarca 10 days. *Admitted* to hospital May 14th, 1916. Mentally confused; severe dyspnoea; irregular heart action; moist râles over lungs; large liver; anasarca to hips; weight 164 lbs.

Roentgen Examination.—Horizontal diameter of cardiac shadow 23.3 cm. Patient *discharged* July 21, 1916 in good condition;



Fig. 1b. Wm. L. Roentgenogram taken March 31, 1916, on discharge.

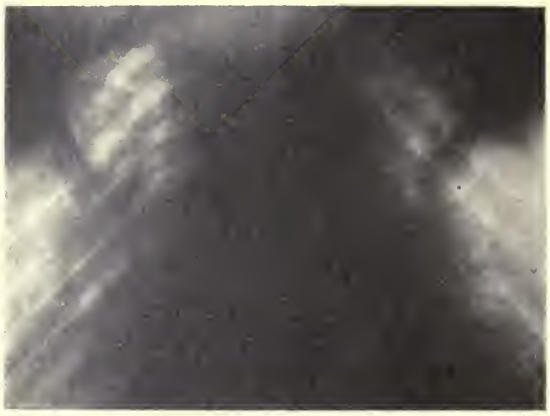


Fig. 2a. And. D. Roentgenogram taken May 14, 1916.

weight 133 lbs; horizontal diameter of cardiac shadow 21.1 cm. As hydrops disappeared through profuse diuresis, patient lost 31 lbs. in weight. *The horizontal diameter of the cardiac shadow, shown roentgenographically, diminished 2.2 cm.*

Case 3.—Nels W., 55. Dyspnoea 3 years; first attack of pulmonary oedema 2 years ago; nightly attacks last 5 days; anasarca 7 days. *Admitted* to hospital April 24, 1916. Cyanosis, severe dyspnoea; irregular heart-action; numerous moist râles and rhonchi over lungs; large liver; trace of albumin in urine; anasarca to abdomen; weight 215 lbs.



Fig. 2b. And. D. Roentgenogram taken July 21, 1916, on discharge.



Fig. 3a. Nels W. Roentgenogram taken April 24, 1916.

Roentgen Examination.—Horizontal diameter of cardiac shadow, 25 cm. *Discharged* May 5, 1916 in fair condition: weight 168 lbs.; horizontal diameter of cardiac shadow 20.5 cm. As hydrops disappeared, through profuse diuresis, patient lost 47 lbs. in in weight. *The horizontal diameter of the cardiac shadow, shown roentgenographically, diminished 4.5 cm.*

Case 4. Henry S., 62. Dyspnoea 7 weeks; during that time a few attacks of cardiac asthma; anasarca 2 weeks. *Admitted* to hospital May 16, 1916. Cyanosis; severe dyspnoea, regular heart-action; small systolic, apical murmur; moist râles over lungs; hydrothorax on right side; ascites; anasarca to hips; weight 235 lbs.



Fig. 3b. Nels W. Roentgenogram taken May 5, 1916, on discharge.



Fig. 4a. Henry S. Roentgenogram taken May 16, 1916.

Roentgen Examination.—Horizontal diameter of cardiac shadow 28.2 cm. *Discharged* June 13, 1916, symptomatically well, weight 178 lbs; horizontal diameter of cardiac shadow 22.8 cm. As hydrops disappeared through profuse diuresis he lost 57 lbs. in weight. *The horizontal diameter of the cardiac shadow shown roentgenographically, diminished 5.4 cm.*

Case 5. Claus H., 52. Syphilitic chancre when 22 years old; dyspnoea 1 month; night-



Fig. 4b. Henry S. Roentgenogram taken June 13, 1916, on discharge.

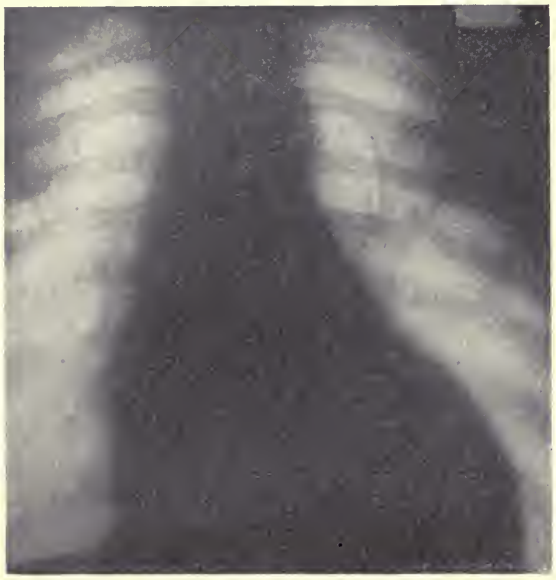


Fig. 5a. Claus H. Roentgenogram taken May 2, 1916.

ly attacks of cardiac asthma, 3 weeks; anasarca 2 weeks. *Admitted* to hospital, May 2, 1916; slight cyanosis and dyspnoea; typical "gallop" rhythm inside the apex; large liver; albuminuria 1.75 per cent; anasarca to knees; weight 219 lbs.

Roentgen Examination.—Horizontal diameter of cardiac shadow 26.1 cm. *Discharged* May 16, 1916, symptomatically well, weight 190 lbs. Horizontal diameter of cardiac shadow 19.7 cm. As hydrops disappeared through profuse diuresis, he lost 29 lbs. in weight. *The horizontal diameter of the heart, shown roentgenographically, diminished 6.4 cm.*

TABLE I

Case	Dyspnoea	Shrinkage of Cardiac Shadow	Loss of Weight
1. W. L.	12 years	2.1 cm.	20 lbs.
2. A. D.	5 years	2.2 cm.	31 lbs.
3. N. W.	3 years	4.5 cm.	47 lbs.
4. H. S.	7 weeks	5.4 cm.	57 lbs.
5. C. H.	4 weeks	6.4 cm.	29 lbs.

A glance at the above Table summarizing the five cases briefly abstracted, shows that in these patients, the diminution of the cardiac shadow was much more pronounced, the shorter was the duration of the preceding period of cardiac failure. The Table also shows that the diminution of the horizontal measurement of the cardiac shadow was much more pronounced the greater was the patient's loss of weight during the disappearance of the hydrops except in Case 5, where, evidently, cardiac failure had not lasted sufficiently long to produce very extensive anasarca.

Discussion.—The usual interpretation of diminution in size of the heart, in cases of the clinical type above summarized is, that a passively "dilated" heart "contracts" under the effect of digitalis therapy. And still, no real proof of the presence of a so-called "passive dilatation" has ever been put forward, since no pathognomic, clinical signs of such condition exist. Even on the autopsy table, a differentiation between simple arrest in diastole, "active", compensatory dilatation, and "passive" dilatation is, to say the least, very difficult, if, indeed, at all possible. It also requires a somewhat active and strained imagination to visualize the possibility of "passive" dilatation of the mighty muscle of a *cor bovinum*.

Assuming, however, that the usual interpretation as outlined above is correct, one would expect, in all cases of cardiac failure, to find a diminution of the size of the heart



Fig. 5b. Claus H. Roentgenogram taken May 16, 1920, on discharge. (The plate is reversed).



Fig. 6a. Roentgenogram J. J. F., taken April 14, 1916.



Fig. 6b. Roentgenogram J. J. F., taken April 21, 1916, on discharge.

taking place while compensation is being restored, hydrops or no hydrops. It is well known that such is not the case. In numerous instances of cardiac failure, the heart returns to a state of compensation without any appreciable diminution of the size of the heart being noticed or demonstrable. The following case may serve as an illustration.

Case 6.—J. J. F., 52. Dyspnoea, periodically for 2 years, continuously for 2 months; nightly attacks of cardiac asthma, 2 weeks; attacks of pulmonary oedema, 2 nights. *Admitted* to hospital April 14, 1916. Severe dyspnoea; engorged jugular veins; typical "gallop" rhythm inside the apex; a few moist râles over the lungs; the liver edge, one finger's breadth below the costal arch; no albumin in the urine; no anasarca; weight 170 lbs.

Roentgen Examination.—The horizontal diameter of the cardiac shadow was 24 cm. *Discharged* April 21, 1916; symptomatically well; weight 168 lbs; horizontal diameter of cardiac shadow 24.1 cm. Although the signs of cardiac failure disappeared, there was no appreciable diminution of the size of the heart, shown roentgenographically (Fig. 6). The slight increase of the horizontal diameter is explained as being due possibly to the slowing of the heart rate from 102 to 70 per minute, with, consequently, a more complete filling up of the ventricles with blood, during diastole. The patient lost only 2 lbs. in weight during hospital residence.

A study of this report proves quite conclusively that a state of cardiac failure may exist without any passive dilatation being present. We are, therefore, justified in concluding that the cardiac enlargement in the previous five cases was not necessarily due to "passive" dilatation, but that it is more likely that it was caused by oedema of the heart.

It is not the author's intention to deny the existence of a "passive" cardiac dilatation in general. On the contrary, it does exist; but a dilated heart is not necessarily incompetent. It has not the same symptomatology as has the oedematous heart and the therapeutic indications are not the same for the dilated as for the oedematous heart. These questions will form the subject of a later article.

BIBLIOGRAPHY

1. Bertin: 1824, cit. from Huchard, Traite Clinique des maladies du coeur et de l'aorte, Paris, 1899, iii, 854.
2. Banti, G:. Ueber die Anatomischen Ursachen der Compensationsstorungen bei Herzklappenfehlern. Centralbl. f. Allg. Path., etc., Jena, 1895, vi, 545.
3. Lissauer, M.: Histologische Untersuchengen des hypertrophischen und insuffizienten Herzmuskels. Munch. Med. Woch., 1909, lvi, 2, 1830.
4. Weber et Blind: Pathogenie des myocardites, Revue de medicene, Paris, 1896, xvi, 705.

ACUTE INFECTIOUS AORTITIS, WITH REPORT OF CASES*

BY GEORGE E. BROWN, M.D., F.A.C.P.,
Consultant in Medicine, City Hospital,
Miles City, Montana.

Part I

THE occurrence of acute aortitis in the course of various infectious diseases is a well-established fact. Morgagni recognized acute inflammation of the aorta, and since his time medical literature has been enriched by further researches in the subject. The French have made many of these observations, but one is struck with the scant attention paid to acute aortitis in American medical literature. Bouilland, in 1840, described rheumatic aortitis. Mery[1] 1902, observed in a child an acute aortitis during an attack of acute rheumatism, with dilatation of the aorta and a rough systolic blow, due to the blood passing over the roughened intima. Renon[2] 1905, describes a case of aneursm developing during the course of acute rheumatism, while under his personal observation. Benert[3] collected twenty similar cases and made the statement that aneursm in children and young adults was due to acute, rheumatic infection.

Acute aortitis in the course of, or as sequelæ of, *influenza,* has been frequently observed. Gutman, von Leyden, Fiessenger and Sansom have recorded many such observations. Marmorstein[4] records a case, with complete autopsy findings, demonstrating influenza bacilli in the vasa vasorum. Powell[5] has made several observations of acute influenzal aortitis clinically, with anginal symptoms. Allbutt[5] has reported several cases of influenzal aortitis with aortic valvulitis and anginal symptoms.

Aortitis occurring in the course of *diphtheria* is substantiated by many observations.

Martin noted, in an aorta of a child of nine years, dead from diphtheria, plaques due to diphtheritic toxin. Boinet[6] produced definite aortic lesions in the horse, by successive injections of diphtheritic toxin. Curschman[7] reports a case in a boy, aged 16, dying from diphtheria. The aorta showed definite lesions: the wall was thinned and the intima was streaked with whitish lines.

Tuberculosis of the aorta has been reported by Flexner[10]. Oliver[11] reports a case of ulcerative aortitis, due to the *bacillus anthrax.* Bronardel[11] reports acute aortitis in *smallpox;* he found this localization of damage in one-eight of his cases. Landouzy[12] calls attention to *scarlatinal* aortitis. Boinet[13] has observed three cases of acute inflammation of the aorta in *erysipelas.*

In *typhoid fever* observations of acute aortitis have been published by Potain[14], Bureau,[14] Bairie[12] and Chauffard[12]. Boinet[12] reports several fatal cases; in these, the intima of the aorta showed gelatiniform plaques. Clinically, aortitis was found to exist in 6 per cent of typhoid cases. Gilbert and Leon[15] have produced typhoid aortitis, experimentally.

In this paper, I have not attempted to include acute *luetic aortitis.* Observations on such form are quite rare; it would appear that although invasion of the aorta by the *spirocheta pallida* is an early sequence of a primary luetic lesion, the damaged aorta presents few signs or symptoms that permit a

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clinical diagnosis. Perhaps more careful search for evidence of this early aortic infection, may reveal the acute lesion to be more frequently present than has been hitherto supposed. Brooks[8] reports a patient who developed aortic lesions during the stage of luetic roseola. Pye-Smith[5] makes record of a patient, in whom, at autopsy, an acute, luetic aortitis was found; a soft, injected, crescentic syphilide was present; it extended to, and invaded the aortic valve flaps.

Pathology.—The pathological findings in *acute, "rheumatic" aortitis* have been well described by Klotz[9]. This investigator notes essentially similar findings in the acute aortitis of influenza, typhoid fever and diphtheria. The lesions found (in "rheumatic" patients) are quite definite. Usually the intima is not primarily involved. The intimal lesions, according to Koester[16] and Klotz, are secondary to the medical lesions and are found as later changes. The intimal lesions consist of fatty or gelatiniform plaques. The media shows increased vascularity, peri-vascular infiltration of lymphocytes, plasma-cells and edema. The inflammation involves the smaller arteries. The tissues in the vicinity of the arterioles are also diseased. The larger arteries are damaged by the inflammatory process, which apparently travels via the *vasa vasorum.* Myocardial damage is caused by a similar process. The elastic-fibers are split and are involved similarly with the muscle-fibers in the destructive process. The reaction is distinctly an inflammatory one. In localization, the process favors the ascending aorta. There is a similarity in these lesions to those found in luetic aortitis, but with this difference: the latter proceed chronically and progressively, whereas in acute rheumatic fever, the process ends spontaneously, though a predisposition to future attacks remains. The manner in which organisms attack the aorta is as yet not clear, but it would seem as though damage could take place either by direct extension from diseased valves, by attack upon the adventitia and by way of the *vasa vasorum.* In a case reported by Klotz, a strip of healthy aorta was found between the diseased valve-flaps and there was a lesion in the ascending aorta. At times, the common tendency toward healing is not manifested; instead, a progressive, inflammatory reaction occurs with the end result of aneurism. Klotz[9] gives in detail the autopsy findings in a case of this kind. The aortic valves showed extensive destruction. The acute process extended for about one-half centimeter upon the aorta. Above the sinuses of Valsava a portion of the aorta was free from disease. On the posterior surface of the ascending limb of the aorta, an aneurism had formed. Gram-positive cocci were demonstrated in sections of the aorta.

In *diphtheritic aortitis,* the pathology has been demonstrated both experimentally and by necropsy studies. Boinet[6], by repeated injection of diphtheritic toxin in a horse, produced an acute aortitis. The media stood the brunt of the damage: a medial necrosis. Curschman[7] describes the findings in a fatal case of diphtheria. The aorta was thin and pouched and the intima streaked with a network of white lines.

In *influenzal aortitis,* Allbutt cites several cases and gives the autopsy findings in detail. In one of his cases (Marmorstein), the aortic intima showed acute inflammatory areas, with round cell infiltration; this also extended to the medial and the outer coats of the vessel. The *vasae* were injected and surrounded with round cells. The influenza bacilli were demonstrated on section, invading the tissues. Allbutt also cites a case, reported by Cooper, in which perforation of the aorta took place as a sequela of influenza. The tendency of these types of acute aortitis is, however, toward repair and restoration of tissue. This doubtless explains their infrequency at the autopsy table. Nevertheless, there is no doubt but that more careful search for these healed foci in the aorta, by microscopic methods, would entirely change our ideas regarding their frequency. Warthin's work on syphilis has shown, conclusively, that careful microscopic search is necessary in order to establish the anatomical diagnoses of syphilis, and that this disease is much more general in its distribution and

more difficult to cure than has hitherto been supposed.

Symptoms.—The symptoms of *acute inflammation of the aorta* are the same, in a general sense, for all varieties, whether the infecting agent be the diphtheria bacillus, *bacillus typhosus* or other organisms. However, we know that in a large number of cases, symptoms may be non-existent or very slight, and unless one has the possibility of the aortic focus in mind, many instances will be overlooked. In the chronic cases, routine examination of the aorta will frequently disclose the affection, whereas, in the acute cases, the signs are less marked and demonstrable changes in the aorta are clinically, less certain. However, there are a few rather characteristic signs and symptoms, which, if found, are fairly conclusive evidence. I will attempt to mention these, according to their importance:

(*a*) Pain.—This symptom, with its peculiar features, ranks first, and when present and recognized, contributes an important fact to a correct diagnosis. However, it may be absent, and this omission explains the frequency with which acute aortitis is overlooked. When pain is present, it exhibits certain features that are typical for aortic inflammation; it is this peculiar quality of aortic pain which permits the making of a clinical diagnosis of acute aortitis. The intensity of the pain depends upon the extent of the infecting process in the investing coats of the aorta. *The source of aortic pain is intra-aortic tension,* similar to pain in the intestine, the kidneys, etc. The aorta, according to the researches of Thoma, is endowed with special sense bodies, Paccinian corpuscles. These are located in the loose areolar coat on the outer wall of the vessel. The normal aorta responds to violent exercise, with changes in volume, but with no sensation of pain. It is only when an inflammatory process is present, that changes in aortic tension are limited in range and so cause pain. However, in normal aortas, excitement or nervous tension frequently produce a disagreeable sensation—the so-called "throbbing aorta." Such is due to uncoördinated fluctuations in intra-vascular volume, and consequent changes in intra-aortic tension.

The pain of acute aortitis varies greatly in its intensity and properties. It ranges from feelings of "tightness", "weight" or "pressure" sensations over the upper sternum (to which the name "stenocardia" has been given), to the agonizing thrusts of angina pectoris. These differences depend mainly upon two factors, according to Allbutt: first, as already stated, to the depth of penetration of the disease process into the arterial wall, and second, to an acute or subacute activity of the invading organism. However, the difference in sensation, whether the agonizing pang or a vise-like feeling, is one of degree; it indicates that the aortic wall is inflamed; the aortic tension, which normally produces no sensation, then becomes a conscious unpleasant sensation of variable severity.

In addition to true pain sensation, there is another symptom which is quite characteristic of aortic lesions. This is manifested by dread, fear, or mental depression. This phenomenon, so characteristic of angina pectoris, or preceding the actual crisis is a feature of aortic disease. This seems to substantitiate Allbutt's contention, that the symptom-syndrome of angina pectoris is due to disease of the aorta itself. The coronary arteries may or may not be involved in the disease process; but whether or no, such is merely part of the picture and has no bearing on the chief cause of the syndrome. In an autopsy of an instance of luetic aortitis, previously reported[20], the pathological findings bore out Allbutt's assumption, namely, that though attacks of angina pectoris were constantly present, the coronary arteries were patent and thus had no part in the syphilitic process existing in the aortic wall.

In the patients which I have observed, pain did not reach such degree of severity as to permit its being labelled full-blown angina pectoris. Arm radiation was present in Case 2, and radiation up into the neck was noted in Case I. In this patient, the element of depression and dread was prominent. In cases with slight or mild retro-sternal dis-

comfort, ("petit mal" attacks of angina pectoris), arm radiation is not commonly present. It is only when the process is far advanced, that the characteristic syndrome of angina pectoris becomes existent ("grand mal"). It is important to emphasize that *there is no relation between the degree of pain* and the *demonstrable changes in the aorta,* as found by physical or roentgenological examination.

There is not the least doubt that in many instances of acute aortitis, the infection is so mild and of such limited extent that pain or other conscious sensations are entirely absent. In such event there is slight hope of their recognition, until perhaps later demonstrable gross changes take place in the aorta.

In considering the pain or distress of aortitis, it is important to not confuse the precordial distress or oppression with that which is so often noted in cardiac insufficiencies, particularly those of the hypertension group. Such discomfort is over the heart, and usually located in the region of the apex beat. The pain or distress of aortitis is retro-sternal, and usually well defined under the upper third of the sternum, more rarely in the middle or lower sternum.

(*b*) Dyspnoea.—This symptom may be marked in the acute cases and may, in fact, be a presenting symptom. However, it is usually of cardiac origin and should be interpreted as such, even tho experimental evidence has shown that irritation of the first portion of the aorta may be associated with dyspnoea.

(*c*) Cough.—This is more often present where the affection is subacute or chronic. It may be due to irritation by the enlarged aorta of the recurrent laryngeal nerve, or may occur as a consequence of cardiac insufficiency. Severe, suffocative attacks of dyspnoea with cough, have been observed. They resemble paroxysms of asthma. Boinet states that excitation of an area on the first portion of the aorta is capable of provoking spasm of the bronchi. This may explain those so-called "asthmatic attacks" and attacks of "laryngeal spasm" which are occasionally observed in aortitis.

(*d*) Vasomotor Symptoms.—In a case of aortitis in which occurred flushing of the left cheek, with local elevation of temperature, Boinet observed localized sweating in the left, upper chest, and unilateral myosis. He explains this group of symptoms on the basis of aortic irritation of the sympathetic. Experimentally, myosis has been produced in the rabbit, by traumatic irritation of the aorta. In cases of early aortitis, mydriosis may be present. Such may be explained on the basis of irritation of sympathetic nerve-fibers, by pressure or adjacent, inflammatory reaction; later, myosis may appear, as a consequence of paralysis of certain sympathetic fibers. In Case I (*vide infra*) dilatation of the left pupil was early present and it remained after all acute symptoms had disappeared.

SIGNS.—(*a*) Fever.—Elevation of temperature is variable. Many clinical observations are incomplete in this regard. In Case I when the aortic infection was recognized, fever was present. This could not be explained on any other basis than its occurring as a result of active inflammation of the aorta. Popoff, quoted by Allbutt, is quite clear that aortitis has a fever course quite similar to that of endocarditis, but often differing as to its specific cause. Allbutt has observed fever in luetic aortitis.

(*b*) Changes in the Aorta.—In acute aortitis, one would not expect to find marked alterations in the size of contour of the aorta. However, there are certain vascular changes, caused by the infection, which should awaken a suspicion of aortitis when noted. These signs may be divided into two groups:

(1) Those due to alterations in the aorta itself, including involvement of the aortic valves.

(2) Those produced as a consequence of alteration in size of the aorta, with resultant irritation or pressure upon nerves, veins, or contigous air-passages (bronchi, trachea).

(1) *Alterations in the aortic wall* are found fairly early. They are due to weakening of the vessel's coats. The first change is

lengthening of the aorta; this produces an elevation of the arch. This anomaly may be recognized in its early degree by physical or roentgenological examinations. Normally, the aorta, in its descending portion, reaches a point ranging from 1 to 3 centimeters below the left clavicle. One will observe, while making a fluoroscopic examination of the chest that, where the arch curves over to become the descending aorta, a clear portion of the lung is normally visible between the aorta and the clavicle. In the early stages of aortitis, this clear area is absent and instead, the aortic shadow is seen posterior, or even above the shadow of the left clavicle. When this is observed, fluoroscopically, the arch can usually be palpated in the supra-sternal notch; in such circumstances, the subclavians may be palpated above the clavicles. Inspection of the neck will often exhibit typical pulsations, caused by the elevated subclavians. Owing to its anatomical position, the right subclavian is the first to rise above the clavicle. When this occurs, however, the aorta is usually easily palpated in the supra-sternal notch. A similar finding is possible in arterio-sclerosis, hypertension, or in chronic aortitis of any type (Allbutt). If the acute inflammation of the aorta progresses to the chronic stage, further advance of the aortic malformation may be found: alteration in the *width,* (as measured by the orthodiagraphic or teleroentgenographic methods); alteration in the *contour* of the aortic shadow, when viewed anterio-posteriorly or in the right oblique—anterior ("quartering") position. In this position, alterations in the ascending portion of the aorta can be studied. In the acute or sub-acute cases, changes in the aortic wall may be observed with the fluoroscope. When thus observed, diminution in the excursion of the vessel wall, together with increased density of the aortic shadow, speak for cirrhotic thickening of the arterial coats. Vaquez and Bordet[19] describe diagnostic observations upon several cases. In these patients, the changes mentioned were definite, and after subsidence of clinical symptoms, the anomalies disappeared.

Tenderness of the aorta to pressure, during the acute stage of the infection, is often present. It can be demonstrated when the aorta is directly palpable in the supra-sternal notch. In Case I (*vide infra*) the aorta was easily felt and was exquisitely tender to touch.

Auscultation of the heart and aorta may yield no conclusive diagnostic evidence, unless the aortic valves are involved in the morbid process. In Case II below the aortic valves were affected and a double murmur was audible in the aortic area. The usual signs of aortic regurgitation were present: increased pulse-pressure, peripheral pulsations over major vessels, etc. Several authors describe a basal pericarditis, consequent upon inflammation extending to the pericardium; in such circumstances, the usual friction sounds are heard.

Deep pressure over the sternum may produce pain in some patients, and speaks for an underlying active inflammatory process.

I have observed in one patient (Case III below), that the aortic first sound was replaced by a soft blow during the acute attack; this bruit had not been present at examinations made a week previously. The murmur persisted as long as the patient was under observation.

(2) *Pressure Signs.*—In the acute cases of aortitis, these signs are only slightly in evidence. Occasionally they are present early and, when noted, are an important link in the diagnostic chain. Compression of the recurrent laryngeal has been observed, as has, also, compression of the great veins, the trachea and the bronchi. Such pressure signs are, however, more frequently seen in the chronic stages of aortitis. When pressure is exerted on the sympathetic nerves, inequality of the pupils may be present, as has already been mentioned. First dilatation of the pupil is produced, later, contraction. on the side corresponding to the aortic lesion.

Prognosis.—This is difficult to foresee with any degree of certainty. There is no doubt that the aorta is "touched" in many of the acute infections, and that *restitutio ad integrum* is fairly frequent. Wiessel's[17] ex-

haustive researches on arterial changes in infectious diseases are important and significant. From a series of 300 autopsies upon typhoid fever subjects, in which complete examinations were made of the arterial tree, Wiessel drew the following conclusion: Arterial changes are constant in typhoid and complete *restitutio ad integrum* is the rule. From a series reported by Curtice and Watson[18], comprising 70 cases of influenzal angina, statement is made that when acute aortitis occurs in the young, a good prognosis is possible.

At the autopsy table, the finding of small, fatty areas in the intima speaks for previous aortitis. In many cases, the aorta as examined routinely in the autopsy room shows no gross intimal changes, but when more careful examination of the outer and middle coats is carried out, macroscopic and microscopic evidences of inflammation, past or present, are disclosed. Boinet describes a suppurative form of aortitis, which proceeds to a rapid, fatal termination. Sudden death from rupture of the aorta, and in association with angina pectoris, has been observed. Progression to aneurysm formation has been recorded in the rheumatic and the influenzal varieties of aortitis.

The prognosis is more serious when the aorta and the aortic heart-valves are concomitantly involved, or when the myocardium is involved as a part of wide-spread infection. Associated blocking of the coronaries is of serious import.

Treatment.—The regimen of treatment which is indicated in myocarditis caused by infectious disease in general, is applicable to acute aortitis. When acute aortitis occurs during the course of an active infection, no special treatment is required, other than ice externally to the thorax over heart and aorta, absolute rest in bed and sedatives. When aortitis complicates the convalescence of an acute infection, rest is the important factor in treatment. Often the myocardium is affected similarly to the aorta and rest then becomes of double importance. When pain is severe, morphine should be used freely. The general measures for combating the toxemias of any infection are employed in instances of acute aortitis.

Conclusions:

I. It is a well-established fact that acute inflammation of the aorta occurs fairly frequently during the course of, or during the convalescent period of many acute infectious diseases.

II. Clinical signs and symptoms of the complicating acute aortitis may be absent or so slight as to lead to this localization being overlooked.

III. Retrosternal pain or distress, varying in degree from a mild stenocardia to a complete "angina pectoris", is an important symptom of the acute aortic dysfunction.

IV. Minor changes in the aorta, as shown by roentgen proof of its lengthening and elevation, may be the earliest demonstrable sign.

V. The prognosis is not grave in the young. It depends upon several associated factors: the type of infection, involvement of aortic valves, blocking of coronary arteries, and the degree of myocardial damage.

Part II

CASE REPORTS

CASE I.—*Acute Diphtheritic Aortitis.*—Female unmarried, aged 20. Past history negative, with the exception of typhoid fever when a young child—no complications. *Present* illness dates back six weeks; patient had sore throat, with membrane; the throat cultures were positive for diphtheria bacilli. She was given antitoxin six days after the onset of the throat condition. (Patient lived in the country and came into town after a very exhausting trip, and diagnosis and treatment were given six days after the onset.) Patient responded well to antitoxin and was released from quarantine ten days later. After she had been out of bed a few days, she began to feel weak, ran a slight temperature, and heart-rate was rapid. Patient was returned to bed, and bromides, ice and catharsis suggested. She immediately improved, pulse-rate became slower, and she was released from the hospital two weeks later and careful resumption of exercise ordered. After she had been up several days, she was awakened at night by pain in the chest. This pain was substernal and she describes it as a "huge weight or pressure" immediately over the upper part of the sternum. It was rather terrifying to her and she became very nervous and alarmed. The sub-sternal pain radiated up into the throat, causing a choking sensation. There was no arm radiation. The pain was not particularly severe, but it was rather the

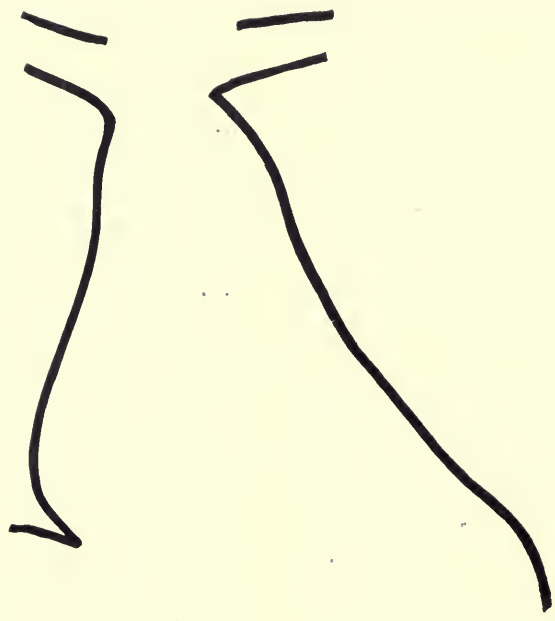


Fig. 1. Case No. 5249. Fluoroscopic tracing of heart and aorta—anterior-posterior view. Note elevation of aorta, changes in contour, slight increase in width.



Fig. 2. Case 1. Fluoroscopic tracing (No. 5249). Taken in the anterior right oblique position. Note the elevation of the arch and the slight increase in width of the ascending aorta.

oppressive feeling accompanying it, which terrified her.

When I saw the patient, she was lying flat in bed, pale, very much alarmed, and dreaded moving. Her pulse was 110. She had some nausea. Examination at this time disclosed the following:

Head negative. *Lungs* negative. In the suprasternal notch, the *aorta* could be palpated very easily. It projected about 1 cm. above the sternal margin and was extremely sensitive to touch. The sub-clavians were just palpable above both clavicles. The *heart* sounds were rapid, the rate varying from 120 to 130. The aortic second sound was increased, the first sound indistinct. The heart apex was 9 cm. to left of midline. No murmurs heard. B. P. $\frac{140 \text{ systolic}}{90 \text{ diastolic.}}$

X-ray examination showed the heart not enlarged. The aortic arch could be distinguished above the clavicle; and the rapid pulsations were barely perceptible. (See tracing, Fig. 1).

Diagnosis: acute diphtheritic aortitis and myocarditis.

Patient was sent to the hospital. She remained in bed, with ice bag to the upper sternal region. She was given 1000 units of antitoxin, small doses of digitalis, bromides, and remained absolutely quiet for three weeks. During the first week, she had slight exacerbations of fever of a very irregular type, ranging from one to two degrees. This disappeared at the end of the second week. Her improvement was slow but progressive; the aorta gradually receded, tenderness disappeared, cardiac rate returned to normal and she was discharged greatly improved.

Final examination showed the heart-rate 90, regular, and heart tones of good quality; aorta 2d +; arch not palpable; no sub-sternal distress or pain on deep percussion; B.P. $\frac{135}{90}$, left pupil slightly dilated and larger than the right. (See tracings Figs. I and II).

RESUME

A case recovering from diphtheria, presenting symptoms due to aortic inflammation and showing certain definite signs of aortic alterations, which could only be attributed to recent diphtheritic infection.

CASE II.—*Influenzal Aortitis.*—Man, aged 52, farmer. Patient came to our office complaining of "heart trouble". His family and personal history were negative and he denied veneral disease. *Present trouble* dates back a year ago when he had a very severe attack of influenza. During this attack, the patient had a good deal of pain in the mid-sternal region. He describes this "as if the heart were being held in with a belt, or weight—a vise-like pain," which lasted several minutes at a time. After he had recovered from the acute attack and was up and around, this pain became more continuous, lasting as long as 12 hours. He seemed to recover from this condition, but had another attack three months later, following a severe drive. There was some dyspnea with this attack, and he thought that he was dying. The pain radiated to both arms and also to the right leg. After this time, the dyspnea became marked and gradually grew worse. He began to notice swelling of the feet, some abdominal bloating and distress after eating.

His *examination on admission* showed a large man: weight 176 lbs., height 5 feet 8½ inches. *Head examination*: negative, with the exception of right pupil, being slightly irregular; reactions normal. *Lungs*, negative. *Heart examination*: apex 16 c.m. to left of midline, right heart-border 3 c. m. to right of midline. The aortic arch measured 8 c. m. by percussion. The sounds were not clear; but no definite murmurs could be made out

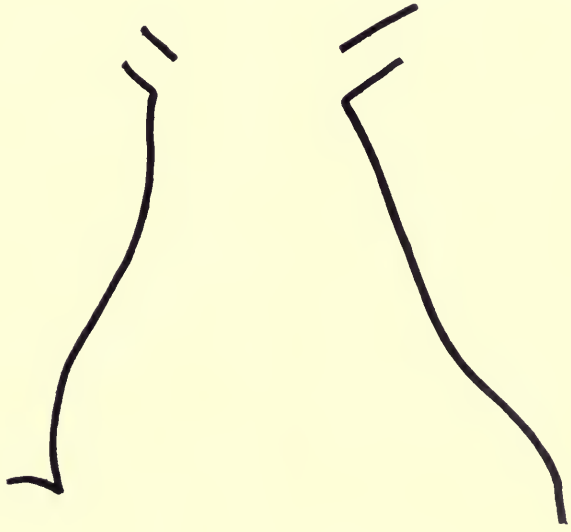


Fig. 3. Case II. Orthodiagraphic tracing (No. 4909). Taken at 30 inches antero-posterior position. Note huge heart, and wide aortic arch.

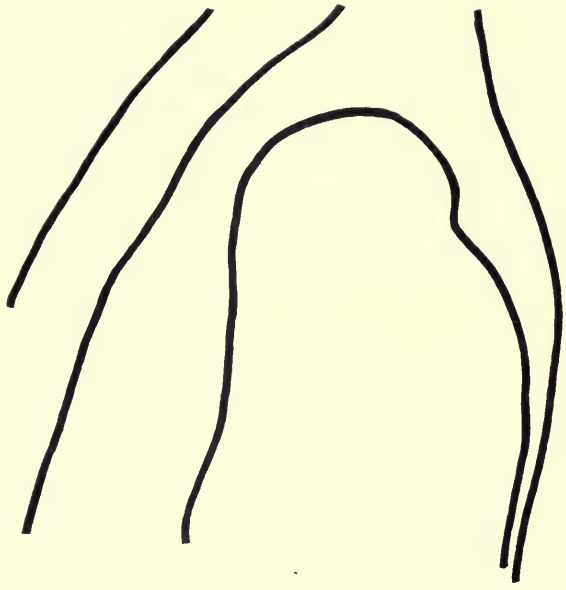


Fig. 4. Case II. (No. 4909). Roentgen-plate tracing. Taken at 30 inches, left posterior oblique position. Note very marked dilatation of the aorta.



Fig. 5. Case II. Roentgen-plate tracing, (No. 4909), two months after treatment. Tracing taken at 30 inches. Anterior-posterior view. Note diminution in size of aortic arch, and of transverse diameter of heart.

at this time. Heart in fibrillation: B. P. $\frac{160}{100}$.

The *liver* was enlarged, dulness being 12 cm. and palpable below the costal margin in midline; it was tender. The *abdomen* was swollen. Both legs were edematous.

Laboratory Examination.—The urine was negative. Two Wassermann tests were negative. *Blood urea*, 20 milligrams per 100 c.c. *X-ray examination*, tracings taken at thirty inches, showed a heart enlarged transversely. *Aorta* enlarged and distorted; a breast plate at 7 ft. gave the following measurements: transverse diameter of heart 19.5 cm., aortis arch 7 cm.

The patient was sent to the hospital and placed on Karrel diet, digitalis, catharsis and rest. He remained in hospital three weeks. He improved very slowly, but at the end of three weeks he was discharged, with evidences of considerable objective benefit. The examination upon discharge disclosed the following:

Heart examination showed the apex in the 7th I.C.S., 15 cm. to the left of the midline; aortic 1st sound replaced by soft blow not transmitted. The 2nd aortic sound was replaced by a soft diastolic blow heard best at the left of the sternum in the 3rd I.C.S. *Mitral sounds*: first mitral, replaced by a soft blow; 2nd sound negative. The *aorta* was palpable in the supra-sternal notch: both sub-clavians were felt above the clavicles. The *liver* was still enlarged and somewhat tender. (See Figs. III, IV and V.)

RESUME

This is a case of a man aged 52, developing cardiac decompensation following an attack of influenza. This man had been examined a year previously for life insurance and passed as normal, as far as his heart was concerned. During the attack of influenza, he developed pain ascribed to acute aortitis; this pain assumed anginal characteristics. While under observation at the hospital a diastolic murmur was discovered. Examinations for syphilis were negative: There was no history of "rheumatism." The aorta was enlarged, could be palpated, and showed recession under treatment. I have no hesitancy in calling this a case of acute aortitis developing during an attack of influenza, and later presenting cardiac insufficiency as a result of the incompetent valvular function.

CASE III.—*Influenzal Aortitis.*—Young girl, aged 18, with negative family and personal history.

Present trouble: Patient was observed during an ordinary attack of influenza, fever lasting six days, temperature ranging from 100° to 103° F. Temperature became normal on seventh day but patient was advised to remain quiet for another week; this advice was carried out. On the second day of convalescence, she was awakened by a sharp cutting pain, well localized under upper third of the sternum, and radiating into the left neck. The pain was very severe and she lay very quiet in dread of its recurrence. The element of fear was marked and patient was greatly alarmed and very apprehensive. She was seen again in 16 hours and though the pain was still present, its character was described as "a heavy weight". She stated that she felt as tho some one were pressing in on her sternum. There was no cough nor pain in breathing. He temperature varied from 99.2° to 99.6° F., pulse-rate 104-110.

Examination.—Patient pale, frightened look; pupils moderately dilated, and equal. *Lungs*, negative. *Heart*, no enlargement detected, apex 5 I.C.S. inside nipple, mitral sounds negative. At base, 1st aortic sound, replaced by faint murmur, which could be followed up to sternal notch, and could be heard in the sternal notch when bell of stethescope was placed directly on the aorta. 2nd heart sound, indistinct. *Aorta palpated* in sternal notch, not tender, no evidence that aorta was increased in width was found by percussion. Deep percussion over sternum caused slight pain.

Patient was kept under observation ten days and was observed by Dr. Buskirk during my absence. Temperature became normal, and on the fifth day pain had disappeared. Was examined at the office on the tenth day: no symptoms, temperature and pulse normal. Urine examination negative, Wasserman negative.

Fluoroscopic tracing at 30 inches showed no increase in width of the aorta. There was a lengthening of the aorta, as shown in Fig. VI.

RESUME

A case of influenza, which, after subsidence of the acute symptoms, presented the picture of an acute aortitis. Under conditions of rest, cold applications, etc., the condition rapidly subsided. In the differential diagnosis of this case, one should consider acute mediastinitis, acute pericarditis, acute pleurisy. In considering the first, mediastinitis, one is not justified in saying this condition was not present. It may have merely progressed to the aortic lesion, but with the characteristic pain, elevation of temperature, alteration of aorta, and changes in the valve sounds, I have no hesitancy in diagnosing this case as acute aortitis. In considering the other possibilities, it should be noted that there were no signs present to confirm such diagnoses. Hysteria could be absolutely ruled out.

CASE IV.—*"Rheumatic" Aortitis.*—Young man, aged 19.

Past history.—Acute rheumatism at age of 14, following tonsillitis. One year later, he noticed palpitation of heart and dyspnea. At 16 years,

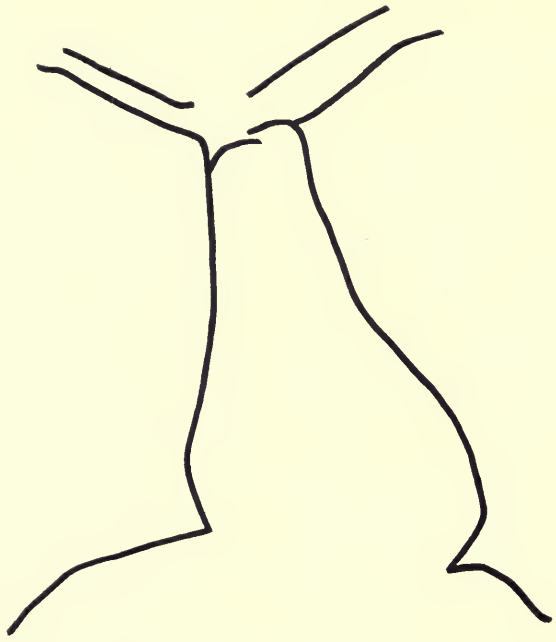


Fig. 6. Case III. Fluoroscopic tracing (No. 5599) of antero-posterior position, taken at 30 inches. Note absence of dilatation of the arch, but observe its elevation to the suprasternal notch.

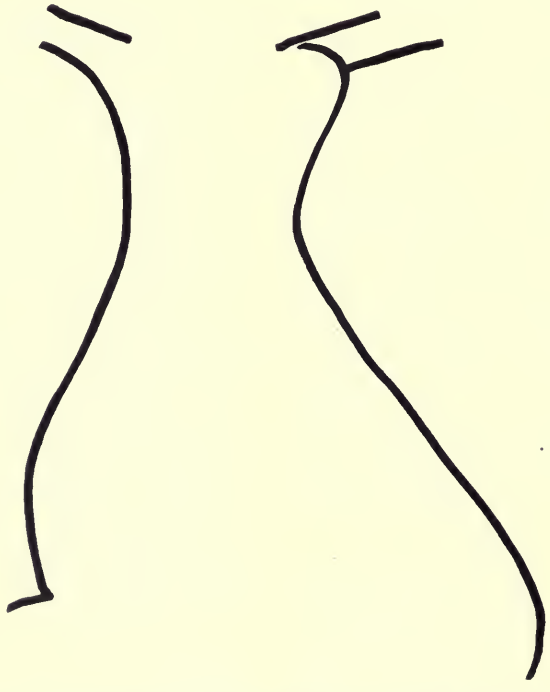


Fig. 7. Case IV. (No. 4804). Orthodiagraphic tracing of heart and aorta. Note the long "aortic heart," and the elevation of the aortic arch.

he had a second attack, and was confined to bed seven weeks. While under observation, a cardiac lesion was found. An aortic regurgitant murmur, at first soft, then more pronounced, was recorded. Later observation showed double aortic and mitral murmurs. Patient at no time complained of substernal pain or distress. During the attack, aorta was easily palpated in episternal notch, not tender; subclavians elevated. Since tonsillectomy, he has had no further attacks.

Examination 10/17/19.—Head negative, except for two abscessed teeth; marked throbbing of arteries in neck; aorta palpable, and large systolic excursion noted. *Heart apex*, 7 I.C.S., 11.5 cm. to left of midsternal line; large thrusting impulse. *Aortic arch* measured 7 cm. in 2 I.C.S. on percussion; no thrills palpable. At mitral area, faint systolic and diastolic murmurs heard. *Aortic area*, a double murmur audible: A loud diastolic blow heard best over lower sternum, and a systolic murmur heard up into neck and in episternal notch, directly upon the aorta. The pulse was typical Corrigan, but regular, and of good tension; capillary pulsations were seen.

Lungs and abdomen negative.

Laboratory Examination.—Urine and Wassermann tests negative.

Roentgenological Examination.—On fluoroscopy heart was shown to be enlarged to left and downward—"aortic type." The aorta had an abnormal contour, was elongated and projected above clavicle, and there was a wide excursion during systole; the aorta cast a dark shadow and its borders were clear cut.

Orthodiagraphic Measurements.—Heart width 15 cm. *Heart length* 18 cm. *Arch* 6 cm. Vaquez-Bordet Index 20. (See tracing Fig. VII).

RESUME

A young man, who, during an attack of articular rheumatism, developed an aortitis with subsequent involvement of aortic valves. The changes in the aorta were shown by, 1st: elongation and elevation; 2nd: changes in contour and increase in width; 3rd: involvement of aortic valves; 4th: changes in density of vessel wall.

REFERENCES

[1]Mery: Les Affections aortique chez l' Enfant. *Revue Generale de Clinique et de Therapeutique*, 1903.
[2]As quoted by Boinet: "Maladies de l'Aorte".
[3]Zeitschr. f. klin. Med. Bd., lxix (quoted by Allbutt).
[4]Marmorstein: *Rev. de Medicine*, 1908, March.
[5]Allbutt: Diseases of the Arteries, p. 163, Vol. II.
[6]Boinet: Maladies de l'Aorte, p. 367.
[7]Curschman: Pathol. d. Krieslamps., *Art. Med. Klin. zu Leipzig*, 1893.
[8]Brooks: *Am. Jour. Med. Sc.*, Oct., 1913.
[9]Klotz: Arterial Lesions Associated with Rheumatic Fever. *Journal of Pathology and Bacteriology*, Vol. xviii, 1913 and *Trans. Ass. Amer. Phys.*, 1912.
[10]Bulletin Johns Hopkins Hospital, 1891.
[11]*Lancet*: London, 1891.
[12]Roger: Quoted from Boinet in "Maladies des Arteries".
[13]Roger: Maladies des Arteries et de l'Aorte.
[14]Bureau: Quoted from "Les Aortities".
[15]*Comptes Rendus de la Soc. de Biol.*, Oct. 12, 1899.
[16]Koester: *Ber. Klin. Wchnschr., 1876*, Bd. xiii, S. 454, quoted by Klotz.
[17]Wiessel: *Zeitschr. f. Her-kund*, Feb., 1905, July, 1906, quoted by Allbutt.
[18]Curtice and Watson: *Internat. Med. Mag.*, Jan., 1893.
[19]Vaquez and Bordet: Le Couer et L'Aorte.
[20]Brown: *Am. Jour. Med. Sc.*, Feb., 1919.

INFECTION OF THE DIGESTIVE TRACT; LATE RADIOGRAPHIC APPEARANCE OF THE DIGESTIVE TRACT IN CHRONIC ENTEROCOLITIS*

BY CHARLES G. STOCKTON, M. D.

Emeritus Professor of the Principles and Practice of Medicine, Department of Medicine, University of Buffalo,
and
CHARLES F. DEWITZ, M. D.
Buffalo, N. Y.

OUR knowledge of the bacteriology, anatomical state and physiologic changes in infections of the digestive tract is too indefinite. That is the excuse for the presentation of this history of a somewhat unusual case. This case has been carefully studied and, with the exhibition of a few radiograms, will, I hope, be of interest.

A married woman of thirty-six showed signs of malnutrition, anemia and lassitude. There were hypochlorhydria, and active gastric motility, with no intestinal symptoms; the stools were well digested. After a period of mental rest, physical training and regulated meals, followed by hydrochloric acid, the patient improved greatly and disappeared from observation for three years.

She then returned, affected with diarrhea of several months' duration, and unchecked by ordinary treatment. A gastric examination showed complete absence of secretion, the presence of mucus in excess, red and white blood-cells, saprophytic bacteria and streptococci. The stools were liquid, acid, and showed excess gas on fermentation. Cultures from the stools showed that the *Bacillus aerogenes capsulatus* was the predominant organism present.

A diet of lean meat and claret wine was instituted. It was followed by temporary improvement. Then ensued abdominal discomfort, alkaline, putrefactive stools and the continuance of gas in excess. The diet was then limited to Bulgarian butter-milk. Hydrochloric acid was given (fifteen drops six times a day), shortly after taking buttermilk; lavage was practiced daily. After the stomach was cleansed, it was rinsed with a solution of thymol one day, salicylic acid the next, and a weak silver solution the next. The patient made gradual improvement. The diarrhea was controlled, appetite improved, the patient gained in weight and returned to her home. There she resumed ordinary diet and improved for two weeks, gaining fourteen pounds. She then developed jaundice, but without fever or local abdominal tenderness.

Three weeks later she again returned to Buffalo. The diarrhea had not reappeared; her appetite was fairly good; the anemia had not increased; there was a leucocyte count of 6,100, a hemoglobin of 78 per cent; the temperature reached 99.6° F. in the evening. The stomach, which had formerly emptied rather hurriedly, now retained a luncheon,

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consisting of solid food, for five hours. There had been no nausea. *The gastric secretion had returned,* total acidity being 20, free HCl 12 or .04 per cent with absence of organic acids.

Physical examination showed a slightly distended abdomen; the hepatic dullness was increased in area, the gall-bladder was palpable, and there was slight tenderness along the lower margin of the liver and over the duodenum.

After washing out the stomach a duodenal tube was introduced. Through this alkaline somewhat turbid duodenal contents were aspirated, which showed traces only of bile and pancreatic ferments, but many pus-cells and red blood-cells. Thus, there was evidently duodenitis, closing the common duct at the papilla. When slight suction was applied to the tube blood appeared. The stools were formed and clay-colored. There was an unusual number of starch granules and meat fibers, slightly changed, an increase of mucus, many soap and fat crystals, no bile, no pus, no blood, free or occult. *Cultures from the stools* showed streptococci; on fermentation no gas developed. Cultures from the duodenal content showed many *Streptococci viridantes.*

Under treatment, the duodenitis rapidly decreased; free bile and pancreatic secretion appeared in appreciable amount. A week later, although the stools showed bile coloring and diastatic ferment was present in the duodenal contents, there developed intermittent fever with jaundice varying in intensity, i. e. characteristic of angiocholitis. In fact, although the duodenitis had subsided, the infection had extended to the bile-ducts. After ten days the symptoms of cholangitis gradually subsided.

Treatment.—Duodenal feeding was established with milk and dextrimaltose, the end of the tube being 32 inches from the teeth. Between feedings, 1 c.c. of saturated solution of magnesium sulphate was slowly instilled into the duodenum, through the tube, followed by a like amount of liquid petrolatum. Subsequently 0.50 c.c. of cold, saturated, aqueous solution of salicylic acid was used in the same way. After one week, the tube was removed and a soft diet permitted; salicylic acid was continued. A few days after the beginning of the treatment, first the blood disappeared, then mucus and pus-cells; the bacteria decreased in number, the bile and pancreatic ferments increased. After a few days of treatment, bile reappeared in the stool. Palpation now showed a decrease in the size of the gall-bladder. The obstruction at the papilla had decreased or disappeared, but there was now a mild cholangitis, perhaps cholecystitis, with characteristic recurrences of fever, as before stated.

During the remission there was subsidence of jaundice. The febrile recurrences became less intense, and, with this, there reappeared a marked enterocolitis. This time it was more severe than ever, with frequent large undigested stools, foul in odor, containing many gas bacilli, streptococci and colon bacilli. The color of the stools often changed, but they all gave evidence of the presence of bile. At this time, the stools became very large, and there was absence of all signs of pancreatic activity. There was much unchanged starch, much soap, many fat crystals, some free fat and undigested muscle-fibers. It was decided that the infection had extended into the radicles of the duct of Wirsung, causing a degree of pancreatitis, corresponding with the cholangitis. On two occasions there was moderate hemorrhage; comparatively bright blood appeared in the stools.

The fluoroscope and radiograms showed a dilated, inactive stomach, a moderate ptosis of stomach and intestines, with but little peristalsis. The colon was large, comparatively motionless, with incomplete haustra at long intervals; after a bismuth meal, on colon injection with a barium enema, it showed practically no peristaltic waves, was dilated and gave the appearance of a large motionless tube, such as has been described as characteristic of atonic colitis. There was evidence of spasticity only at the sigmoid. Sigmoidoscope examinations, made on several occasions, revealed an edematous appearing mucosa, hyperemic, and, on one oc-



Fig. 1. Meal Plate. Taken shortly after a period of stasis and atony.

casion, showed marked congestion, with enlarged follicles.

Improvement in the patient's condition and control of diarrhea began with the administration of small doses of opium and a "bland diet" of mixed foods. This time the Bulgarian milk failed to give relief.

The enterocolitis has now largely subsided, but, even yet, there are occasional slight elevations of temperature for a day or two, always succeeded by an appreciable return of the icteric tint. Streptococci are yet found in the stools, also spores of the gas bacillus. There is general improvement in the patient's condition, and complete recovery seems probable. At present, while the



Fig. 3. Plate taken 6 hours after meal. Note deformity of cap.



Fig 2. Plate taken 1½ hours after meal. Note deformity of cap.



Fig. 4. Plate taken 24 hours after meal. Note long distance between haustra.



Fig. 5. Colon injection. Note wide and long colon, hose-like in appearance; no visible peristalsis.

patient is convalescent, there are intervals when the outflow of bile and pancreatic juice is undoubtedly diminished, and probably neither bile nor pancreatic juice excretion has at any time returned in normal proportion.

Laboratory Notes on the Case

By Charles F. DeWitz, M.D.

Stools

Oct. 8, 1919—The *Bacillus aerogenes capsulatus,* with spores, was for the first time discovered in the stool.

Oct. 14, 1919—No free starch; stools heated, milk added, but no gas developed on fermentation.

Oct. 23, 1919—Evidence of starch. Stools heated, milk added; gas present.

Oct. 28, 1919—No free starch. Stools heated, milk added; gas ¼% as indicated in the "Einhorn," fermentation tube. Gas bacilli found, also a few spores.

Oct. 30, 1919—No gas in fermentation tube; no bacilli, but many spores.

Nov. 1, 1919—Neither gas bacilli nor spores. No gas on fermentation.

Nov. 11, 1919—Same. At this time, the diarrhea had disappeared; the patient went home, gaining in weight.

Dec. 27, 1919—Patient returned with jaundice. Stools acholic. Very slight evidence of diastatic function in stools. No gas developed in starch solution on fermentation. Free starch present in stools, as shown by microscope with iodine stain.

Feb. 11, 1920—Moderate diarrhea. Welch's bacillus again found. Stools with starch solution made a slight showing of gas in "Einhorn" tube; starch unchanged (on fermentation.) Fehling's solution not reduced. With dextrimaltose, gas developed to 13%.

Feb. 18, 1920—Mixture of stool with starch gave gas to ½% in "Einhorn" tube. No free starch remained and no reduction of Fehling's solution.

Mar. 9, 1920—No free starch. Gas developed to 1% in "Einhorn" tube with dextrimaltose.

Apr. 1, 1920—A few gas bacilli found; with boiled stool, no gas developed with dextri-maltose.

Apr. 17, 1920—Large amount of starch in stools; no diastatic ferment. Stools very large; much fat present.

Apr. 19, 1920—No starch seen in stools. Disappearance of gas bacillus.

Study of Duodenal Contents for Diastatic Function.

Dec. 27, 1919—Duodenal content upon fermentation shows only a trace of gas. (In normal duodenal content the starch is readily converted to sugar, and with further fermentation there is gas formation. No free starch is found. If fermentation is complete the content will reduce Fehling's solution.)

Dec. 28, 1919—Small amount of gas developed from starch and duodenal contents in fermentation tube, with slight reduction of Fehling's. Starch convert-

ed to maltose or dextrose. Test made at time when the dextrins had not been changed to maltose or glucose; therefore Fehling's was reduced only to a slight extent. No free starch demonstrated.

Dec. 31, 1919—No gas on fermentation. Faint reduction of Fehling's.

Jan. 3, 1920—No gas on fermentation. Fehling's solution reduced 3+.

Jan. 5, 1920—Gas on fermentation ¼% in "Einhorn" tube. Fehling's solution not reduced. (Intermediate products of amylolysis do not reduce Fehling's.

Feb. 17, 1920—Starch solution mixed with duodenal contents showed on fermentation very little gas in 18 hours. Much unchanged starch. No reduction of Fehling's. Pancreas evidently inactive.

NOTES

In the resorption process in the intestine it is interesting to note that the intestinal mucosa is only slightly permeable, not only to high molecular colloids, but also to disaccharids, but it is permeable to the monosaccharids. The mucosa permits only those sugars to pass readily which can easily be used by the tissue cells; i. e. the monosaccharids. Apparently the tissue cells are not adapted to dealing with the majority of disaccharids, as may be shown by the fact that if cane sugar or lactose be introduced parenterally, (i. e. by cutaneous or intravenous injection), they are simply excreted without change. This is not true of maltose, because the blood contains the ferment "maltase," which is capable of splitting the parenterally introduced maltose into glucose after it has entered the circulation.

Observation shows that the influence of pancreatic diastase upon the starch from oats is such that it is quite readily converted into sugar. Observation also shows that potato starch, while very readily changed into achroödextrin, is only very slowly converted into sugar.

THE VALUE OF ESOPHAGOSCOPY IN THE DIAGNOSIS OF DISEASES OF THE ESOPHAGUS*

BY ELMER B. FREEMAN, M. D.

IN this paper I desire to mention the indications for, and the contra-indications to esophagoscopy and to discuss the value of this method of examination in the diagnosis of carcinomatous, spasmodic, cicatricial and compression stenosis of the esophagus.

The Indications for Esophagoscopy.—Any abnormal sensation referred to the region of the esophagus, any difficulty in swallowing or the presence or suspicion of a foreign body should be sufficient evidence to warrant an esophagoscopic examination. In no other way may we hope to make early diagnosis of many of the diseases of the esophagus. How fortunate it would be if, in cases of spasmodic stenosis at the level of the diaphragm, we could make the diagnosis before there was dilatation of the esophagus! I believe early esophagoscopy in these cases would reveal, more frequently than we have thought, a simple ulcer or an abrasion of the mucosa as the cause of the spasm. Esophagoscopy is essential in the diagnosis of stricture, not so much in the location of the stenosis as in differentiating between the various ailments capable of causing obstruction and in noting the condition of the esophagus above the stricture. In many cases of foreign bodies in the esophagus, the diagnosis can be made only by esophagoscopic examination, and in all cases, their safe removal can be accomplished only by the esophagoscopic method.

The Contra-Indications to Esophagoscopy.—The contra-indications to esophagoscopy are: aneurism of the thoracic aorta, cardiac disease with hypertrophy, arteriosclerosis with marked hypertension, thyroid disease, advanced pulmonary tuberculosis, cirrhosis of the liver and curvature of the spine in the cervical and dorsal regions. However, none of these are considered contra-indications if esophagoscopy is being done for the detection and removal of a foreign body.

Stenosis of the Esophagus Caused by Carcinoma.—Cancer of the esophagus occurs most frequently in men. The early symptoms, referable to the esophagus, are those of mild dysphagia, gradually increasing as the disease progresses until, in some late cases, symptoms of complete stenosis occur. As a rule, the location of the growth is at the anatomic narrowings of the esophagus. These are at the level of the cricoid, the aortic arch, the left bronchus and the diaphragm. However, most of the growths occur in the middle third of the gullet.

The esophagoscopic appearances of cancer vary greatly according to the stage in which the examination is made and whether the growth is primarily in the esophagus or secondary to malignant disease in one of the adjacent viscera.

Jackson states that he has every reason to believe that the very early stage of esophageal cancer occurs as a leukoplakia in at least a few instances but that the opportunities for early esophagoscopy in cancer are so rare that there is no means of determining the frequency of such type of onset. He states that, in these cases, the mucosa ap-

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pears as though it had been burned with silver nitrate. In other instances, an early manifestation of malignancy is sub-mucosal infiltration which gives a sensation of increased resistance in the esophageal wall. This is always the early finding when the carcinoma involves the gullet from without; in these cases the mucous membrane remains grossly normal for a long time.

As the disease progresses, other local changes are noted, as: irregularity in the lumen, the obliteration of the normal mucosal creases and folds, the absence of inspiratory and expiratory movements; no wrinkling of the mucosa may occur when pressure is made with the esophagoscope.

Later on, definite polypoid protrusions into the lumen, with consequent marked irregularity in the outline of the growth are noted. At this stage, there is definite congestion of the mucous membrane and, in many cases, a beginning ulcerative degeneration of the growth. After ulceration has occurred, the appearance of the ulcer is not entirely dependent upon the carcinoma, but is partly caused by secondary infection with pyogenic organisms. A malignant ulcer is usually irregular in outline, the surrounding mucosa much inflamed, the ulcer surface granular, and slightly elevated. It bleeds easily when sponged. Definite areas of necrosis may be found in the more fungoid and cauliflower types of neophasmata.

Late in the disease, one is impressed by the marked rigidity of the diseased area, the tortuosity of the lumen, the ease with which bleeding occurs, the absence of scar-tissue and the small degree of dilatation above the growth. The slight degree of dilatation of the gullet is due to cancerous infiltration of the wall of the esophagus and to obstruction coming on late in the disease.

Endoscopically, a malignant ulcer may be confused with one due to lues or tuberculosis. In *luetic ulceration,* the following characteristics usually are seen: the edge of the ulcer is elevated and surrounded by markedly inflamed mucosa; the surface is frequently depressed; there is no excessive granulation tissue and there is very little bleeding when the ulcer is sponged, although the surrounding mucous membrane may seem much inflamed. The *tuberculous ulcer* is superficial, rather anemic in appearance; the granulation tissue is not excessive; the ulcer edges are not elevated; the surrounding mucous membrane is not markedly congested and the surface does not bleed easily when sponged.

Before a differential diagnosis can be made, these findings, while very important, must be further corroborated by the clinical history, physical examination, *x*-ray and other laboratory studies. It is very easy, while making an esophagoscopic examination, to remove a bit of tissue for microscopical study. This should be done in all doubtful cases.

Stenosis of the Esophagus Caused by Spasm.—It is possible for spasmodic stenosis to occur at any point but it is usually found where there is a definite anatomic narrowing, either at the cricoid or the level of the diaphragm. Normally, there is a sphincter-like occlusion of the esophagus at the lower border of the cricoid, caused by the lower fibers of the inferior constrictors of the pharynx. A similar occlusion also occurs at the diaphragm, due to the sphincter-like arrangement of muscular fibers.

Esophageal spasm is usually reflex and may be caused by local diseases of the esophagus or be associated with extra-esophageal diseases, the most frequent of which are irritative lesions of the gastro-intestinal tract. However, in many cases there is a neurotic basis.

Stenosis Occurring at the Lower Border of the Cricoid.—When stenosis occurs at the cricoid, the disease is essentially a spasm of the circular fibers of the inferior constrictors of the pharynx. The presenting symptom is difficulty in swallowing. This difficulty the patient describes as inability to *start* the bolus of food downward. After the food is once started, however, it passes uninterruptedly into the stomach. There is no regurgitation of food, except in those cases where there is an associated spasm at the diaphragm. A dysphagia of this sort denotes a

high obstruction of the esophagus, the nature of which must be determined by an esophagoscopic examination. In a few cases, the spasmodic stenosis will be found to be due to an organic lesion.

Some cases of spasmodic stenosis occurring at the cricoid cannot be endoscopically differentiated from the spasm that always occurs upon introducing the esophagoscope. In other instances, the mucosa is apparently thrown into folds which radiate from a central point or, again, the entrance into the esophagus appears as a transverse or crescent-like slit. The mucous membrane is normal in appearance, except in those instances where an organic lesion is the exciting cause of the spasmodic stenosis. In such cases the appearance of the mucosa will depend upon the type of organic lesion present.

In spasms, by far the most important endoscopic finding is that, when slight pressure is made with the esophagoscope, the spasm relaxes and no further difficulty is experienced in passing the instrument into the esophageal lumen. The same kind of relaxation may be produced by having the patient breathe deeply. I desire to report the following case:

Case Report: Mrs. J. W., a white woman, age 30, entered the Maryland General Hospital, March 10th, 1920. *Complaint*: Dysphagia, fullness and discomfort after eating.

Family History: Negative except that mother died, aged 42, of carcinoma of the stomach.

Past History: Negative for infectious diseases, but the patient has complained of the following digestive symptoms for ten years: Fullness after meals, some nausea, occasional vomiting, marked eructations of gas and obstinate constipation.

Present Illness: For six months prior to entering the hospital, patient suffered from dysphagia which she described as inability to swallow her food. Only about half of her attempts at swallowing were successful and it would take her an hour to eat a meal which a normal individual would eat in thirty minutes.

Physical Examination: Rather pale, anemic looking woman, showing evidence of marked loss in weight; *pupils* react to light and accomodation; no tenderness over the sinuses, antra or mastoids; slight purulent discharge from the left ear; *teeth* present definite evidence of pyorrhea; *throat* negative; *heart* of normal size; sounds clear at the base and apex; *blood-pressure* 136/86; *lungs* apparently normal to percussion and auscultation; *abdomen*: narrow costal angle; muscles relaxed; freely moveable right kidney and no local tenderness; extremities normal; reflexes active.

Laboratory Studies. (*a*) *Urine analysis*: Normal.

(*b*) *Stomach Analysis*: Fasting stomach: No seven-hour retention. Test Meal: Free HCL absent; Total Acidity 14 degrees; Mucus, 2 plus.

(*c*) *Stool Examination*: Occult blood absent.

(*d*) *Blood Examination*: Hæmoglobin 90 per cent; Erthrocytes per c. mm. 4,736,000; Leukocytes per c. mm. 7,600.

Fluoroscopic Examination: *Chest*—Very small heart of vertical type; no dilatation of the aorta; apices of the lungs apparently clear; no irregularity of the diaphragm. *Esophagus*—No esophageal dilatation. *Stomach*—Fishhook type; four fingers below the iliac crest; well to the left; very atonic; good duodenal cap brought out by palpation; no caecal stasis: hepatic flexure of colon below the crest; transverse colon prolapsed well into pelvis; very spastic.

Esophagoscopic Examination: This revealed a definite spasmodic stenosis at the cricoid region.

(Note: The spasm was relieved by the passage of the esophagoscope and dilatations with a No. 40, French scale, bougie every third day for four weeks).

Stenosis Occurring at the Diaphragm.—Usually, in these cases there is no difficulty with the bolus of food entering the esophagus, but the difficulty is with the food entering the stomach. These patients generally have the sensation of the food being lodged behind the lower segment of the sternum, the sensation being described as "fullness" without pain. Later in the disease, many symptoms are added which are due to dilatation of the esophagus and disturbances in nutrition.

In cases of spasmodic stenosis at the diaphragm, no difficulty is experienced in introducing the esophagoscope until it reaches the level of the diaphragm. There it meets definite resistance, but with gentle pressure the spasm relaxes and the esophagoscope passes into the stomach. Early in the disease, the endoscopic appearance of the esophagus may not differ from the normal. Late in the disease, the esophagus is very much dilated, the walls are atonic, the mucosal folds obliterated, the respiratory movements are absent, the mucous membrane shows evidence of chronic inflammation and, in many cases, superficial ulceration is present. Personally, I believe that at least a few of these cases have their origin in ulceration of the esophagus. The condition as described above, is usually called "chronic cardiospasm." However, in my experience, I have never seen a spasmodic stenosis at the car-

dia. I agree with Jackson that the spasm occurs at the level of the diaphragm.

Case Report of Mr. J. S., age 42, carpenter, admitted to Out-Patient Department of Johns Hopkins Hospital, April 15th, 1914.

Complaint: Difficulty in swallowing.

Family History: Negative.

Past History: Negative.

Present Illness. For six years previous to coming under observation, patient complained of difficulty in swallowing. He stated that the food seemed to lodge behind the lower end of the sternum. This was followed by regurgitation of food, but the patient discovered that by drinking one or two glasses of water after eating, a portion of the meal entered the stomach and the regurgitation was relieved. He had lost about forty pounds in weight and had been unable to work at his trade for two years.

Physical Examination: Negative for organic lesions.

Laboratory Studies: (*a*) *Blood*: Wassermann reaction negative.

(*b*) *Urine Analysis*: Negative.

(*c*) *Stool Examinations*: Occult blood test negative.

(*d*) *Stomach Analysis*: Unable to introduce tube into the stomach, but obtained approximately 1000 c.c. of a foul smelling fluid from the esophagus; this contained a large amount of mucus and undigested food.

Fluoroscopic Examination: *Esophagus* very markedly dilated; definite obstruction at the level of the diaphragm; bismuth passed into the stomach very slowly. *Stomach* normal in size and below the crest; no deformity of duodenal cap; no caecal stasis; hepatic flexure of colon below the crest; transverse colon prolapsed into true pelvis.

Esophagoscopic Examination: Esophagoscope passed without difficulty to level of diaphragm and there definite resistance was met, but gentle pressure caused the spasm to relax and the instrument passed into the stomach. There was a small scar at the level of the diaphragm; the esophageal wall was very atonic, dirty gray in color, chronically inflamed, and presented several small superficial ulcers.

(Note: The stricture was dilated with a Plummer dilator twice a week for ten weeks, after which time the patient was symptomatically cured. Fluoroscopic examination showed however, that there was no decrease in the size of the dilatation and that food passed into the stomach slower than normally. This patient returned to work two months after treatment was discontinued and has been symptomatically relieved since that time. The esophageal dilatation has persisted).

Stenosis of the Esophagus Caused by Cicatricial Tissue.—Cicatricial stenosis is the result of a healed ulcer, either simple, tuberculous, luetic or associated with one of the acute infectious diseases. A simple ulcer is usually traumatic and is generally caused by the swallowing of a corrosive liquid or the lodgment of a foreign body in the esophagus. However, some are due to less violent local trauma and may result from slight abrasions caused by the swallowing of coarse articles of food.

The *symptoms* complained of, as referred to the esophagus, depend almost entirely on the degree of stenosis. In many cases, with slight stenosis, no dysphagia is noticed until the patient tries to swallow some coarse article of food, while, in the cases with marked stenosis, the patient is unable to swallow even liquids. Symptoms of complete stenosis may occur in these cases, by the lodgement of some coarse article of food in the stricture.

Stenosis Caused by the Swallowing of a Corrosive Liquid.—The stricture which results from the healing of an ulcer caused by the swallowing of a corrosive liquid may occur at any point in the esophagus. It is usually situated at one of the anatomic narrowings. In my experience, this form of stenosis occurs most frequently in the middle third of the gullet at the crossing of the left bronchus; next in frequency, in the lower third at the level of the diaphragm and, (as yet, I have not seen a case) in the upper third of the esophagus. The degree of stenosis varies from slight narrowing to a complete occlusion of the lumen. In some cases, there may be more than one stricture.

The appearance of the esophagus depends on the degree of stenosis, the duration of the disease and the character of poison taken by the patient. If the stenosis is slight, and the esophagus has not been irritated by coarse food, the mucosa appears normal and there is no dilatation above the stricture. If the stenosis is of high degree, marked changes in the wall of the esophagus will be noticed above the stricture. All food and secretion must be removed before one can make a satisfactory examination. Cicatricial tissue in the esophagus is always paler than is the normal mucosa. It may appear almost white. The appearance of the stricture depends upon the location of the scar. In some cases, a linear scar will be seen with a draw-

ing-in of the wall of the esophagus. In other instances, the scar is seen to cross one side and cause a flattening of the lumen. In others, the scar causes a polypoid protrusion into the lumen. In many cases, the scar tissue almost encircles the esophagus, causing anular stricture. In the high grades of stenosis, definite dilatation of the esophagus occurs above the stricture. The mucosa is inflamed and, frequently, there are noted superficial abrasions and sometimes ulcerations. This condition of the mucosa above the stricture no doubt increases the symptoms of obstruction by reflexly causing spasm.

Case Report: Master H. R., a child, three years old, was referred to me by Dr. Bloodgood and Dr. Crist.

Clinical Note: Entered St. Agnes Hospital September 15th, 1916, with the following history. One year ago, drank some concentrated lye which caused a gradually developing stricture that could not be relieved by frequent attempts at dilatation; at the end of six months a gastrostomy was performed to save the child from starvation. About five months after this operation, Dr. Crist succeeded in passing a "uterine sound from the stomach upward", after which the child was able to swallow liquids for three weeks.

When I first saw him, one year after the drinking of the corrosive, he was emaciated, anemic and markedly prostrated. *Radiographic examination* showed an apparently complete stenosis at the crossing of the left bronchus, and marked dilatation above the stricture. The *esophagoscopic examination* confirmed the radiographic diagnosis of stricture with dilatation. It further revealed a markedly inflamed mucosa with a number of superficial abrasions.

(Note: After removing some particles of food and secretion from the stricture, it was found that the lumen was not completely occluded, and after a number of attempts, we were successful in passing a No. 12, French scale, bougie.)

Stenosis Following the Removal of Foreign Bodies.—The stricture which results from the healing of an ulcer caused by the lodgement of a foreign body is most frequently located in the upper third of the esophagus, which is the narrowest part of the viscus. Some may occur in the middle and lower third.

Recently, I saw a patient who complained of pain and difficulty in swallowing and who stated that Dr. Johnston, of Baltimore, had removed a foreign body from the esophagus two years previously. An esophagoscopic examination revealed a moderate degree of stenosis in the middle third.

Stenosis Due to Lues.—Cicatricial stenosis of the esophagus due to lues is rare. However, dysphagia coming on after middle life, makes one think of syphilis as a possible cause of the stenosis. The stricture most frequently occurs in the upper third. Endoscopically, the cicatrix due to syphilis does not differ in appearance from scars due to other causes. I wish to report the following case of stenosis due to lues.

Case Report: Mr. J. L., age 40, white, married, referred July, 1913, by Dr. Hobbleman.

Complaint: Dysphagia.

Family History: Negative.

Past History: Typhoid at the age of 34; lues 10 years ago. Moderate user of alcoholic stimulants for 15 years.

Present Illness: Began to suffer about six months ago with "pain on swallowing", which was soon followed by a dysphagia that became progressively worse. When I first saw him, he was able to swallow only small quantities of liquids. He also complained of dyspnea, marked prostration and rapid loss of weight.

Physical Examination: Upon examination the patient looked very ill, was emaciated and slightly cyanotic. Otherwise the general physical examination was negative.

Laboratory Studies: Our routine laboratory studies revealed a three plus Wassermann Reaction as the only positive finding of interest.

Esophagoscopic Examination: This showed a dense scar involving the upper end of the esophagus and the wall of the pharynx.

Stenosis Due to Tuberculosis.—Cicatricial stenosis of the esophagus due to tuberculosis is said to be extremely rare. However, it might be found to be more frequent if a routine esophagoscopic examination were made in tuberculous patients suffering with dysphagia. This is illustrated by the following case.

Case Report: Mrs. I. C. L., age 30, white.

Clinical Note: Admitted to St. Agnes Hospital and assigned to the Medical Service, where a diagnosis of pulmonary and laryngeal tuberculosis was made. She complained of marked difficulty in swallowing. An *esophagoscopic examination* was made and it revealed a stenosis of the upper end of the esophagus, resulting from an extension of the tuberculous process in the larynx.

Stenosis Associated with Acute Infectious Diseases.—Cicatricial stenosis due to the healing of ulcers associated with the acute infectious diseases has been well established but it has not come under my observation.

Stenosis of the Esophagus Caused by Compression.—Compression stenosis of the esophagus may be due to an enlarged thyroid, cardiac hypertrophy or aneurism. However, it is usually due to mediastinal disease. *Endoscopically,* the lumen of the esophagus at the site of the compression appears as a transverse slit and the normal folds are obliterated. The mucosa is normal in appearance except in a few cases where there is a chronic inflammation due to stasis.

If, while making an esophagoscopic examination, definite resistance is met and the wall of the esophagus is apparently normal, one should always bear in mind the probability of a compression stenosis. In these cases, no attempt should be made to pass the obstruction. Compression stenosis can usually be diagnosed by other methods and esophagoscopy should not be done in these cases except for the detection and removal of foreign bodies.

CONCLUSIONS

In conclusion, I wish to warn against esophagoscopy in compression stenosis, to emphasize its value in the diagnosis of cicatricial and spasmodic stenosis, and, finally, to urge esophagoscopy as a routine examination in all cases with symptoms referred to the region of the esophagus. By so doing, it will be possible in many cases to make an early diagnosis in diseases of the esophagus, which, at present are not diagnosed until the disease is far advanced.

A CONSIDERATION OF ETIOLOGIC FACTORS IN PULMONARY TUBERCULOSIS*

BY ROBERT S. BERGHOFF, M. D.

Associate in Medicine, Rush Medical College,

CHICAGO.

NO single phase of pulmonary tuberculosis has been the subject of such prolific discussion and study, as has its etiology. The literature of the 17th and 18th Centuries is especially replete with theories fanciful and varied, some of which in the light of our present knowledge are amusing Take for example, that of Beddoes as expressed in a letter written by him in 1793 to Erasmus Darwin. Beddoes, who held the Chair of Chemistry at the University of Oxford, occupied a place of prominence amongst the phthiso-scientists of his day. The title and a brief excerpt of Beddoes letter is as follows:

"A New Method of Treating Pulmonary Consumption and some Other Diseases hitherto found Incurable". (By Thomas Beddoes, M. D., Bristol. Printed by Bulgin and Rosser.)

"If it be true however as so many medical practioners believe, that Consumption is now much more frequent, it is easy according to my system to understand whence this has happened: the inhabitants of this Country almost without exception breathe a freer and purer air than their ancestors. Nor do I believe that there is any particular in which the difference between the present and some past generations is so remarkable. You see then that the subjects of our Edwards and our Henrys and of good Queen Bess may have found in being more free from so formidable a disease than our delicate and airy posterity, some compensation for the confined air and filth in which they passed their

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existence." A study of Beddoe's writings which were extensive, portray a pathetic groping for knowledge, directed towards the etiology and treatment of consumption. We find that at the culmination of his many years of crude pioneer research, he arrived at the firm conviction that "Pulmonary Consumption is of a fact due to Hyper-oxygenation". Like Beddoes, there were hundreds of sincere thinking men who after years of original study, floundered about in uncertainty and wild concepts regarding a disease more ravishing than any pestilence or epidemic fever.

Nor has the discovery of the tubercle bacillus entirely put an end to the fanatacisms and wild imageries of the zealous-minded. To the followers of tuberculosis, the subject of its causation has always been rife with interest, the explanation lying perhaps in its mysticism and uncertainty. Unlike its morbid anatomy, which is an open book and admits of no conjecture, the predisposing factors offer a rich field for speculation. French, English and American writers have eyed with distrust and voiced their suspicion of almost every known disease, condition and circumstance, in their search for logical factors of predisposition towards tuberculosis. Even at the present writing, authorities, while they have discarded most of the time-disproved theories, are not in perfect accord.

That the tubercle bacillus is the direct cause, is of course indisputable, but from that fact as a starting point, the path deviates and leads to an interminable maze of individual opinion. There is a re-assemblage of forces in the universally accepted theory of childhood infection.

All pulmonary tuberculosis has its inception in infancy and early childhood. This orthodox rule allows but few if any exceptions. We are all aware that tuberculosis in early life manifests itself as an adenitis. We know that the lymphatic glandular system bears the brunt of tuberculosis infection in childhood, in about the same ratio as does the respiratory tract in adult life. The bulk of tuberculosis in childhood is due to direct contact with an open case; the small remaining percentage is due to the ingestion of milk containing the bovine tubercle bacillus. That the bovine tubercle bacillus is responsible for tuberculous adenitis, and even later on for pulmonary tuberculosis, is proven by isolation of a pure culture in both diseases. Individual opinion and statistics differ as to the percentage of bovine infection, all admit its relative infrequency. Those who champion the belief of mutation of types, that is, the gradual metamorphosis of the bovine into the human bacillus, insist on a higher percentage for the former. It is probable however, that the bovine bacillus is responsible for less than 5% of tuberculosis in infancy and early childhood, and perhaps considerably less than one-half of one per cent in adult pulmonary tuberculosis.

The important major premise that all pulmonary tuberculosis has its origin in infancy and childhood, and the minor premise that the human type of bacillus is responsible for the bulk of infection, must, in the light of past experiment and present knowledge be accepted.

Tuberculous adenitis, the precursor of adult pulmonary tuberculosis is the primary infection. And it is a real infection: pulse, temperature and constitutional symptoms and signs attesting to the fact. In most instances, where passive immunization is rapid and complete, the disease is relatively mild. In fact observation of hundreds of cases of glandular tuberculosis in children, leads one to wonder whether it is not merely a design on the part of Nature to begin early her process of passive immunization against the more virulent and powerful adversary which in adult life will attack the respiratory tract. If the child during the course of the glandular infection, develops ample reserve immunity, then the infection has had a two-fold effect. It has served as the atrium of infection for the pulmonary condition which may develop later in life, but it has at the same time stored up antibodies which are subject to call, and will serve as an active powerful barrier. In advancing this theory, that of beginning passive immunization dur-

ing childhood infection against pulmonary tuberculosis in adult life, I do so with the realization that it is largely speculative. Phthisotherapists are agreed that adult pulmonary tuberculosis derives its causative factor from early glandular infection, and it is logical that along with the offending cause, the tubercle bacillus and its toxins, the adult acquires an immunity which is passively increased with the passing years.

Adult pulmonary tuberculosis or the secondary manifestation of the tuberculous infection, is in the nature of a metastatic process. Individual immunity being at a low ebb due to one of many predisposing factors to be discussed later, metastases, or a spread of the dormant glandular infection to the respiratory tract takes place, and the result is the active pulmonary tuberculosis of adult life. The glands which have successfully harbored inert bacilli and toxins, yield their host and the battle transferred to another field is on again. There are some instances, rare exceptions, in which the direct offending cause, the invading host, is acquired thru contact with an open case of pulmonary tuberculosis in adult life, without precedent childhood infection. There are then two essential requisites for a beginning pulmonary tuberculosis; the primary infection of childhood, plus the fertile soil, the lowered resistance, the predisposition.

In taking up the matter of predisposition and its bearing on the etiology of pulmonary tuberculosis, only the more important elements will be considered, and those briefly.

Heredity.—The belief that tuberculosis is transmitted from father or mother, or thru a skipped generation, from grandfather or grandmother to grandson or granddaughter, was for a long time popular not alone amongst the laity, but with the profession as well. And this in spite of the fact that the amount of proof to substantiate the claim was negligible. This theory, in the absence of logical proof, owed its birth and existence to the coincidence elicited in many a family history. The father and perhaps the mother and several brothers all had tuberculosis and died therefrom; the patient has tuberculosis, therefore his condition is an hereditary one. False logic to be sure, and yet it was from this coincident history, that the theory derived most of its popularity. Experimental work on animals tended to strengthen the belief. It was demonstrated by a score of reliable men that animals made actively tuberculous by systematic injection of virulent tubercle bacilli, gave birth to tuberculous progeny. Baumgarten[1] in 1891, demonstrated this in chickens. But on summing up and separating the wheat from the chaff, the remaining proof was meager and unsatisfactory.

In line with the theory of heredity and really allied with it, is that of placental transmission. The belief in intra-uterine infection had many advocates, but like heredity, the proof was lacking, and today, congenital tuberculosis is also discredited. The child of a father or mother actively tuberculous at the time of its birth, is handicapped and influenced in two ways. First, because it is deprived of an eugenic start in life. Born of sick and weakly stock, the first powerful asset against tuberculosis is denied it, that of a robust and healthy body. Second, and far more important, the child of an actively tuberculous parent, is subjected from its earliest infancy to infection thru direct contact. Especially is this so, if the affected parent be the mother. With the direct offending cause, the tubercle bacillus in her sputum, she fondles, kisses, and countless times each day paves the way for transmission of the organism into fertile receptive soil, the entirely unimmunized infant. To resume, heredity *per se,* is not an important predisposing factor towards pulmonary tuberculosis. Direct contact with an actively tuberculous parent, is an all important factor, responsible for a heavy percentage of adult pulmonary tuberculosis.

Diseases of the Respiratory Tract.—Any condition or disease which impairs, locally and permanently, the respiratory tract, especially the lung or pleura, is a predisposing factor towards pulmonary tuberculosis. Thus, a simple bronchitis, or repeated bronchitises of brief duration and mild degree,

predispose only so long as they act as irritants or otherwise interfere with the normal respiratory function. A severe protracted bronchitis which results in an inflammation of the fine terminal bronchioles whose filaments are contiguous with the air vesicles, is a correspondingly greater menace.

Bronchial Asthma.—In contra-distinction and refutation of what has just been said, bronchial asthma often times causing extreme interference with normal respiratory function, and at times permanent injury to lung and pleura, predisposes little if any towards pulmonary tuberculosis. The reason is largely speculative, though the atrophic condition of the parenchyma may in a way be responsible, offering as it does an unfriendly soil.

Pleurisy.—In discussing the pleurisies as predisposing factors the various types must be considered separately.

Pleurisy Effusio Primatica, a pleurisy with effusion associated with a bronchitis, not preceded by pneumonia, is a definite tubercular infection almost always. There may be an occasional stray primatic pleurisy with the pneumococcus or the pyogenic organisms as the responsible cause. The rule however admits of few exceptions, so that primary pleurisy with effusion is synonymous with tuberculous pleuritis. The focus of infection in such pleurisies may be located in the parietal pleura, however in the vast majority of cases, it is of pulmonary origin. An active pulmonary tuberculosis with a lesion superficially located, affects the visceral pleura by contiguity.

Pleurisy Plastica, or "Dry Pleurisy" is of tuberculous origin in a heavy percentage of cases, provided it be a true pleurisy. A pain in the chest, cough, etc., are not sufficient to justify such a diagnosis. The typical grating friction rub heard over the irritated and agglutinated layers of pleura, plus signs of constitutional disturbance, bespeak an inflammation of the pleura which is tuberculous in origin almost always.

"Transfusion Pleurisy", often following as the aftermath of a lobar pneumonia, while less frequently of tuberculous origin, is a definite predisposing factor. Not alone does it protract convalescence, and undermine generally an already weakened constitution, but by its prolonged effect of lung impairment and pleural irritation, it paves the way for the active breaking down of the healed tuberculous focus which so many of us harbor. The same holds true for the accumulation of fluid following cardiac or renal insufficiency. Non-tuberculous in origin, they pave the way for re-activation of lung or pleural focus.

Acute Infectious Diseases.—The belief that measles presents a strong predisposing factor, has enjoyed an unreasonable degree of popularity. Even to-day the theory is given a wide credence. I have had occasion to examine and follow up more than five hundred cases of measles, and have elaborated the findings and results in an article recently published. The conclusion arrived at was, that measles deserves no important place amongst the predisposing factors. Just why measles should have been looked upon with such strong suspicion for so long a time, is not clear. A mild and rather inoffensive infectious disease, which runs as a rule a very moderate febrile course, with some slight skin manifestations, and a negligible bronchitis, it really presents no features to justify the importance placed upon it. Of five hundred cases of measles examined and re-examined by myself, only one gave conclusive proof of a re-activation directly attributable to measles infection.

Influenza.—Influenza has never been considered with sufficient seriousness, nor alloted its proper place as a predisposing agent. Statistics gathered on the subject on the occasion of the wide-spread influenza epidemic in 1891, by the health departments of several large representative cities of the United States furnished no proof of any direct association between the two diseases. And yet influenza invariably runs an incomparably more severe course than does measles, and is associated with more extensive and more lasting local irritation. A study made by myself[3] during the epidemic of 1919 on more than thirty cases of

quiescent and healed pulmonary tuberculosis, none of which showed, prior to influenza infection, any signs of activity thru a period of long observation, revealed re-activation of thirteen cases directly attributable to influenza—or over forty per cent.

Occupation.—Like many of the infectious diseases, so the importance of the various occupations has been generally overestimated. Industrial tables, elaborately prepared, were offered as concrete evidence that this occupation or that, was a dangerous and formidable one, one which eventually must lead the unfortunate so employed to a phthisical end. Trades and occupations must be gauged solely from a sociological and sanitary standpoint. A weaver or spinner who is employed in a sanitary work-room, and who after his day's toil is done, goes home to nourishing food and refreshing sleep, may go blithely about his work, and ignore the fact that his occupation is listed as a dangerous one.

In conclusion, it must be borne in mind that the most important conditions serving as predisposing factors towards pulmonary tuberculosis are:

1. Contact with an open case of pulmonary tuberculosis in infancy and childhood.
2. Unfavorable sociological surroundings in early childhood as well as in adult life.

These conclusions should lead to the *following practical points, therapeutically*: 1. An infant of an actively tuberculous parent should be guarded as early and as thoroughly as possible, even if this entails the separation of the infant from the parent. Especially is this so if the parent be the mother. A wet-nurse should be substituted whenever feasible.

2. At the age of four or five years, all suspect glandular patients should be carefully examined and checked with *x*-ray examinations and Von Pirquet test. If a positive diagnosis is arrived at, such a child must be treated sanely but vigorously. I have been much impressed with the observation that the treatment of glandular tuberculosis in infants and children is wofully desultory and haphazard. The many hundreds of cases of glandular tuberculosis, so diagnosed by the family physician or by our local dispensaries, are merely diagnosed, the treatment embraces an ineffective tonic, plus advice as to the value of fresh air and sustaining diet. It is my firm conviction that it is as essential to enforce absolute rest on a tuberculous infant or child, with an active lesion, as it is in the case of adult instance of pulmonary tuberculosis. The exact mechanism of immunity, like that of fever, is far from being a clear picture but we do know that rest is the greatest synergist of that process we call passive immunization. When we remember that the one big end in view in the treatment of glandular infection in children is not the subsidence of symptoms, but the attainment to the fullest degree of immunity against the secondary manifestation (the metastatic process of adult life), we are impressed with the importance of absolute rest. Just as the primary infection is immeasurably less severe than is the secondary, so is the period of rest required commensurately shorter. I believe ten days to two weeks in the average case is sufficient.

3. All school children at the age of seven years, or if that is too radical, then at least all suspicious cases should be given a Von Pirquet, and if positive, a thorough course of protective treatment should be instituted.

4. Children who have had glandular infections, should be closely watched and followed into adult life. They should be dealt with frankly and warned that pernicious habits such as excessive smoking, excessive venery, venereal disease, etc., may light up the smouldering ember and result in an active pulmonary tuberculosis.

REFERENCES

[1]Baumgarten: *Arb. a. a. Gebiet d. Path. Anst. u. Bact.*, 1891.
[2]Berghoff: *Ill. State Jour.*, Dec., 1918.
[3]Berghoff: *Amer. Rev. Tuberc.*, Aug., 1919.

EPIGASTRIC HERNIA WITH SYMPTOMS OF PYLORIC OBSTRUCTION*

BY ALEXIUS McGLANNAN, M. D.

Professor of Clinical Surgery and of Surgical Pathology, Department of Medicine, University of Maryland,

BALTIMORE, MD.

COMPARED with the frequency of hernias of the lower abdominal wall, the epigastric form is an unusual lesion, making about one to two per cent of the cases in any large series.

In my own small series there are three epigastric in a list of 478 hernias.

The etiology and development of an epigastric hernia is a matter of considerable interest. In one of my cases the protrusion followed a severe blow by a sharp-edged timber against the upper portion of the left rectus muscle. Hotchkiss[1] quotes Roser as thinking "that the subperitoneal fat penetrates along the course of the vessels and nerves, often without the formation of a hernial sac; or in some cases the constant dragging upon this lipoma may result in sac formation and the appearance of a true hernia." Moschcowitz[2] proves Roser's theory to be the correct one.

Lathrop[3] shows the frequent origin of epigastric hernia in the region of the round ligament of the liver. The rhombic outline of the apertures in the linea alba through which the vessels pass may make it easier for the protrusion of the subserous fat[4].

That gastric symptoms may be produced by reflex action from peritoneal irritation is a generally accepted fact. Thus we may account for various digestive disturbances occurring in patients suffering from hernias of any kind or size. The epigastric form however, may have a definite symptomatology, which in many ways resembles that of gastric and duodenal ulcer, except in the relation of the symptoms to the ingestion of food. Moschcowitz[5] describes this symptom complex, and reports a number of corroborative cases.

There are periodic attacks of pain in the epigastrium. The patients complain of eructations and nausea, but rarely vomit. The ring in the fascia through which the protrusion occurs is always extremely tender. The area of tenderness is sharply defined and is superficial in situation.

Aaron[6] describes similar symptoms as Umbilical Dyspepsia. Hall[7] describes an "electric bell reaction,—a touch on the hernia causes instantaneous belching". This electric bell reaction was present in a marked degree in my traumatic epigastric hernia.

Hotchkiss (l.c.) gives the history of these hernias, the first of which was described by Arnauld of Villineuve in 1285.

Garangeot in 1743 recognized the hernia as the possible cause of certain obscure abdominal symptoms.

Terrier in 1885 insisted on the intimate relation of these hernias and various painful abdominal conditions.

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D. D. Stewart[8] reviews the literature on epigastric hernia, especially in its relation to gastric symptoms.

Gatewood[9] could find no case on record in which the stomach made part of the contents of the hernia. The symptoms are always reflex in origin, unless they are due to actual disease of the stomach or duodenum.

The association of gastric or duodenal ulcer with epigastric hernia has occurred often enough to lead to speculation regarding the influence of the hernia on the production of the ulcer. While this relation of cause and effect is not clearly proven, the occurence of both lesions in the same individual is frequent enough to justify the extension of the hernia operation to include an exploration of the stomach and duodenum through the wound[10].

The two cases which I now report show the similarity of the symptoms of epigastric hernia with those of pyloric obstruction.

CASE I.—Surg. No. 14,383. This patient, a man of 72 yrs. of age, was studied through the courtesy of Dr. C. F. Blake at the Mercy Hospital, Baltimore. He had a large epigastric hernia which had been present several years. He came to the hospital on account of frequent vomiting, with loss of weight and strength. The study of the gastric contents showed absence of hydrochloric acid with food retention.

The *x*-ray examination indicated a pyloric obstruction, most likely due to carcinoma. An irregular contour of the greater curvature and pyloric region and hypermobility were noted with the fluoroscope. A filling defect and six hour retention were observed on the plate.

At operation Dr. Blake proved the absence of any gastric lesion and the symptoms are therefore attributed to the hernia.

CASE II.—Surg. No. 11,445. This patient, a man of 62 yrs. of age, had a right inguinal, as well as the epigastric hernia. He consulted his physician, Dr. Howard Jones, because of gastric distress, with nausea, vomiting and epigastric distention, closely resembling the symptoms of pyloric obstruction. The diagnostic study made by Dr. Jones excluded a gastric lesion and pointed to the hernia as the cause of his symptoms.

On July 5, 1919 I operated on him at St. Agnes' Hospital, Baltimore, repairing both hernias, under procaine infiltration, and exploring the stomach through the epigastric wound. The absence of an organic obstruction was confirmed by the exploration. The epigastric hernia was a true hernia, having a thin sac and containing non-adherent omentum.

The patient has recovered from the operation and has been relieved of all his digestive disturbances.

REFERENCES

[1] *Annals of Surgery*, July, 1911, liv, 78.
[2] *Surgery, Gynaecology, and Obstetrics*, April, 1914, xvlii, 504.
[3] *Boston Medical and Surgical Journal*, Feb. 25, and March 4, 1897.
[4] *Progressive Medicine*, June, 1910, p. 46.
[5] *Annals of Surgery*, Sept., 1917, lxvi, 300.
[6] *J. A. M. A.*, May 13, 1916, lxvi, 534.
[7] *J. A. M. A.*, July 19, 1919, lxxiii, 171.
[8] *American Medicine*, July 29, 1905, x, 185.
[9] *J. A. M. A.*, Jan. 8, 1916, lxvi, 85.
[10] *Progressive Medicine*, June, 1911, p. 50.

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ABSTRACTS
OF CURRENT LITERATURE

CHEMICAL PHYSIOLOGY, SEROLOGY, AND EXPERIMENTAL MEDICINE

EUGMAN, M. F., AND MCGARRY, R. A.: The Treatment of Certain Diseases of the Skin by the Intravenous Injection of a Foreign Protein. *Journal American Medical Association,* 1916, lxvii, pp. 1741-1745.

Experimental work was done in cases of psoriasis, lupus erythematosis, etc.

Some of the cases cleared up remarkably well, but the psoriasis case recurred shortly.

The method is not recommended as a form of treatment for any disease. The report is made to stimulate further investigation, but this should be done only under rigorous care in a well-equipped hospital.

ELLIOTT, G.: Variability in Vulcanization the Cause of Psoriasis. *New York Medical Journal,* 1919, cx, pp. 403-406.

This is an interesting theoretical article seeking an analogy between the vulcanized skin of man and vulcanized India rubber, particularly with relation to sulphur metabolism.

Psoriasis appears on the colder surfaces of the body, tending to get well with warmth and sunlight. It scarcely ever occurs in the tropics. In the southern states it comprises from 1 to 2 per cent of all skin diseases; it is extremely rare in the negro (who can quite likely convert all ingested sulphur in melanin, a keratinozed product). In temperate regions it comprises from 4 to 5 per cent of all skin diseases; in Scotland and Iceland about 8 per cent. Practically all patients with psoriasis are large consumers of foodstuffs in which sulphur abounds; nitrogenous foods are pretty generally forbidden them.

The disease disappears more rapidly when the patient is confined to a warm bed.

SCHAMBERG, J. F., AND RAIZISS, G. W.: A Study of Nitrogen Metabolism of Two Cases of Eczema. *Journal Cutaneous Diseases,* 1917, xxxv, p. 135.

The authors state that they have formerly reported (*Journal Cutaneous Diseases,* Nov., 1913; *Journal American Medical Association,* 1914) that the nitrogenous metabolism in psoriasis deviates from that of normal individuals, in the tendency for nitrogen to become stored up in the body. The elimination of nitrogen in the urine in severe cases was depressed to the lowest level ever recorded in either normal or pathological conditions.

The authors' studies demonstrated that a low nitrogen diet had, in general, a favorable influence on the course of the eruption, and a high nitrogen diet, an unfavorable one. Later unpublished studies have corroborated former findings.

The increase of non-protein nitrogen is

not found in the blood, so that there must be a true tissue retention in which it is quite possible that the skin takes part.

One of the eczema cases showed a marked nitrogen retention somewhat similar to that of psoriasis; low protein diet in this case exerted a gradual and progressive beneficial effect.

VERNES, A.: De la Mesure Colorimetrique de l'Infection Syphilitique. *Comptes rendus hebdomadaires des séances de l'Académie des sciences,* Paris, Sept. 2, 1918, clxvii, 383-5.

The principle of the seroreaction in syphilis may be expressed as follows: "In the presence of a colloidal cultured suspension, the syphilitic serum is precipitated differently than is normal human serum, and the syphilitic nature of a serum is demonstrated by a deviation in stability". Flocculation is apparent, if the tested serum is syphilitic, and it is this quality by which the deviation in stability may be tested.

"Whatever the degree of stability for a certain sample of serum is, it may be measured with the aid of red corpuscles. One must imagine a substance which has at once a dispersing power (antiflocculent) and a hemolytic property, and in which the dispersing power may be utilized at the expense of a proportional part of its hemolytic property; then, instead of judging the level of stability directly by the degree of flocculation, one may calculate it indirectly by the degree of hemolysis, by means of a colorimetric scale. Several substances serve this purpose, especially pig serum."

"*Technic.*—Prepare a suspension of parethynal 1/40 in water, chloruretted at 9 to 1000, so that the opalescence corresponds to tube 3 on the diaphanometric scale. (In the absence of a special mixer, one may obtain the suspension by introducing the alcoholic solution of perethymol with a pipet of 1 mm. bore, letting if flow in a jet into the chloruretted water, which is contained in an Erlenmeyer bottle, and gyrating it vigorously by hand until the mixture is complete). Place 0.8 c.c. in a series of tubes measuring 13 mm. by 60 mm. among which the fresh serum to be tested has been distributed, 0.2 c.c. in each tube, after having heated them for twenty minutes to 55° C. (131° F.).

"Titrate the hemolytic activity of the fresh pig serum exactly, in order to determine the quantity necessary (about 0.150 c.c.) to hemolyze, in twenty minutes at 37° C., in the water chloruretted at 9 to 1000 for a total volume of 2.6 c.c., the washed red corpuscles of a sheep, which, once hemolyzed, will give color number 8 of the colorimetric scale in 2.6 c.c. of liquid, in a 13 mm. tube."

"Add to each test-tube the quantity of diluted pig serum in water chloruretted at 9 to 1000 to bring the volume to 0.8 c.c.

"Place in the drying oven at 37° C.; at the end of seventy-five minutes add to all the tubes the sheep's red corpuscles in the amount indicated above, in suspension in the water chloruretted at 9 to 1000 and in the volume of 0.8 c.c. (The exact division of the reactives into the desired proportions, in a long series of experiments, may present serious obstacles if one has not been accustomed for many years to the use of special instruments, such as aspirating pipets, the rheometer, etc., which assure an automatic certainty and a considerable gain in time. Experience justifies the use of control tubes, in order to make sure that the individual function of the elements involved in the test have not been changed, and that the course of the reaction has been normal).

"Not only are the tubes with normal serum red and the tubes with syphilitic serum discolored above, with a red residue, but the quantity of the undissolved globules gives rise to intermediate tints between white and maximum red, thus constituting a series of syphilimetric indices, the graph of which is of the greatest importance as an indication and control for treatment."

VERNES, M. A.: Sur la Precipitation d'un Colloide Organique par le Serum Humain, Normal, ou Syphilitique. *Comptes rendus hebdomadaires des séances de l'Académie des sciences,* Paris, April 8, 1918, clxvi, 575.

Various tissues furnish products, soluble in alcohol, which, by simple dilution in water, give colloidal suspensions, which can be easily controlled. The liver, heart, muscles, and many other organs contain such products. Horse-heart is prepared as follows:

"Take a *fresh* heart; cut up the muscle, and put the pieces into absolute alcohol for one hour; shake them from time to time. Press out the liquid in a finely woven cloth, and dry at 37° C. Grind fine, and place 30 grams of the powder in a Soxhlet apparatus (mixed with 60 grams of sand, washed in alcohol and drained) with 250 c.c. of ethylene perchlorid (distilled from 115° C. to 121° C.). The container with the perchlorid is heated in a water-bath; the hollow of the apparatus is surmounted by a Vigreux cooler, connected with a vacuum pump (corked and sealed with paraffin, etc.). Distil the perchlorid without exceeding a temperature of 35° C. and in such a way as to give 40 siphons in six and one-half hours (water-bath 60° C. to 65° C., pressure 4 cm.). Dry the powder thus produced at 37° C., then place again in the Soxhlet apparatus with 200 c.c. of absolute alcohol. Distil this in a water-bath without exceeding 30° C. and in such a way as to give 30 siphons in five hours (water-bath 60°—65° C., pressure from 5 to 6 cm. of mercury). Collect the liquid in the container, let it rest for twenty-four hours and filter through paper. Determine the dry extract, bringing 10 c.c. of liquid to 60° C. for eight or nine hours, at constant weight. Restore this to a titer of 15 grams of dry extract per liter, either by the addition of alcohol, or by evaporation at less than 30° C."

The alcoholic solution thus obtained may be called P., or perethynal. Its aqueous solution gives suspensions of granules, the size of which may be controlled by the method of dilution and by the aid of an electrolyte.

(1) DILUTION.—*Variety A.*—Place water in an Ehrlenmeyer bottle and P. in a buret with a stop-cock. Let the P. fall drop by drop; shake the bottle of water so as to produce a sharp rotary motion in the liquid and allow each drop to become uniformly mixed with the water before the introduction of the next drop; continue this operation until the last drop of P. has been introduced.

The granules are below the ultra-microscopic limit of visibility (in the ultra condensor of Leitz-Leutzsch) and the suspension is nearly limpid.

Variety B.—Pour the water drop by drop into the tube containing the P.; this must be shaken all the while. The opalescence is progressive. When it has attained its maximum, the water may be poured in more quickly. A milky suspension results with large granules. (It also contains fine grains. If it is centrifuged at 5,000 revolutions per minute—in the Jouan centrifuge No. 2—for 45 minutes, a residue will be obtained, representing one-third of the weight of the organic substance in suspension. After that time the sedimentation is greatly retarded, and only insignificant residues are found.)

Intermediate Varieties.—Intermediate suspensions may be obtained by modifying the conditions of the mixture (order of distribution, rapidity, form of the recipient, etc.). A scale of opalescence enables one to establish a standard.

(2) ELECTROLYTE.—The action of the electrolyte upon the size of the granules in a suspension depends upon the quantity, nature, and method of introduction of the electrolyte (Na Cl, Ca Cl_2, Ce Cl_3, Su Cl_4, etc.).

Quantity and Nature.—Introduce P. into the electrolyte solutions in increasing doses, and control the opalescence by means of a diaphanometric scale.

Method of Introduction.—Dissolve the electrolyte in water, before putting the P. in suspension *A*. (If the electrolyte is introduced in another manner, for instance, after a suspension of P. has been made in

the distilled water, the granules of P. will no longer be in the desired physical state).

With the chloruretted solutions (Na Cl), with an increasing titer, prepare a series of suspensions *A*, and add normal or spyhilitic sera. (The results obtained for a considerable number of specimens of serum are shown in a chart).

The maximum of differentiation is obtained by making the suspension *A*. in water salted from 3.5 to 4 for 1,000 Na Cl. For suspension *A*. in water at 4 to 1,000 the syph*ilitic serum shows flocculation when the normal serum shows none.*

There are degrees of flocculation from a fine granulation visible on the black bottom, to sedimented flakes. These degrees may be measured.

Non-heated or old sera prolong the common zone of flocculability. Victor Henri saw under the ultramicroscope, large granules appear at 55° C. These formed at the expense of smaller granules. It is necessary to use serum thus physically modified by heating for twenty minutes at 55° C. This diminishes the flocculation of all the sera, by *reducing the extent of the common zone* of *flocculation*, in order to give a sufficient margin of differentiation. The test is very sensitive to variations in temperature. For the preparation of suspension *A.*, reactives and material should have the same temperature, and one must avoid changes of temperature during the test. The test temperature is from 15° to 20° C. to read the results for the second twenty-four hours.

Conclusions.—There is a periodic flocculation of the fine suspensions in the presence of human serum. This phenomenon, already described for mineral suspensions (*Comptes rendus,* etc., 1917, clxv, 769), causing the quantities of serum to vary with respect to oxid of iron, is also found in the case of organic suspensions, causing the physical state of the suspension to vary.

It is possible to control the state of a colloidal suspension so that it flocculates with syphilitic serum and does not flocculate with normal serum.

Robinson, D. M. O.: A Brief Résumé of Vernes' Method for Serum Diagnosis of Syphilis. *Public Health Reports,* Nov. 21, 1919, xxxiv, No. 47, pp. 2665-2667.

(1) Vernes found that "a metallic or an organic colloidal suspension in distilled water, or water containing certain electrolytes in varying concentrations, is flocculated when mixed with blood serum. This flocculation occurs with a definite rhythm, which varies according to the quantities of serum added. There is a zone of flocculation with certain quantities of human serum alternated with a zone of non-flocculation, and one obtains a characteristic picture of interposed zones of flocculation and non-flocculation. This phenomenon ceases to take place when the quantities of serum become too minute to produce any effect upon the equilibrium of the colloidal suspension. Vernes observed this phenomenon first with a colloidal iron suspension of certain concentrations, and then with several other inorganic colloids as well as with those of an organic nature.

"When these colloidal suspensions were mixed with normal human serum, the flocculation did not occur in the same quantities as it did when the suspensions were mixed with the serum from a syphilitic person, i.e., the flocculation zone with normal serum did not occur with the same quantities as it did with syphilitic serum.

"Realizing this fact, Vernes proposed a method by which a normal serum could be differentiated from that of a syphilitic. His method consisted in employing such quantities of serum as those which produce a flocculation of colloidal suspension with syphilitic serum only. By using certain quantities any human serum can, of course, induce the same phenomenon; but this is avoided by a careful selection of quantities within which no non-syphilitic serum can cause a flocculation.

(2) "Vernes found, after further experiments that an extract from the heart-muscles of the horse, as obtained by a thorough extraction of substances that can

be dissolved out by means of perchlorid of ethyl and alcohol from thoroughly desiccated powder of the muscle (using Soxhlet apparatus at 41°-45° C. under reduced pressure), gives a colloidal suspension more stable than is found in connection with colloidal iron when mixed with saline water. It not only yields a finer suspension, but it enables a differentiation of a syphilitic from a normal serum with greater definition. The substances extracted with perchlorid of ethyl and then alcohol, from the dried powder of horses' heart-muscle, are called 'perethynol' from *per* (chlorid of) ethyl, and alcohol. This mass of substances contains various lipoids.

(3) In a reaction dealing with a colloidal suspension it is of the utmost importance to produce a constant suspension each time, capable of being standardized, to ensure a uniform degree of molecular dispersion; otherwise the results obtained could not be compared with one another. The flocculation zone naturally shifts toward one direction or the other, according to the scale of dispersion. For this reason it was prerequisite that a scale of opacity or opalescence should be prepared for standardizing the perethynol suspension on each occasion when one was made."

For this scale Vernes utilized a mixture of tinctures of benzoin and Quillaja with glycerinated water. This is fairly stable if kept under certain conditions. Vernes prepared several grades of opalescence and recommends that Grade 3 be used as a standard for the parethynol suspension to be used in the reaction. A 1/40 dilution in saline solution gives the desired opalescence. Particular stress is laid upon the importance of mixing the perethynol with saline solution by dropping the latter from a buret into the former, under constant agitation. Vernes uses a special set of apparatus in his tests.

(4) "Vernes conceived the idea of translating the flocculation phenomenon into a color reaction, which would be easier to measure. His idea was to find a substance which would indicate the degree of changes in the syphilitic serum by losing one of its activities while counteracting the flocculating effect of the serum upon the colloidal suspension of perethynol.

"According to Vernes, the fresh serum of a pig fulfils this purpose, acting as an antiflocculent toward the syphilitic serum, and at the same time losing some of its hemolytic property upon sheeps' red blood-corpuscles. When mixed with a normal serum, the antiflocculent property of the pig's serum is not used up; hence there is no loss of its hemolytic activity.

"The degree of loss in the hemolytic power of pig's serum, when mixed with the syphilitic serum and perethynol suspension, corresponds with the degree of the specific changes in the human serum in question. From this he proceeded to set up an accurate determination of the change in human serum, due to syphilis, by introducing a colorimetric scale consisting of light degrees of intensity. His scale is a series of artificial tints made to approximate those of various dilutions of laked red-corpuscles. The grades range from 0 (absence of hemolysis) to 8 (complete hemolysis). The scale contains acid fuchsin, picric acid, formal, etc., and is comparatively stable in the dark. Once a color scale is provided, it is easy to prepare a uniform suspension of sheep's corpuscles on each occasion by taking this concentration which will give the color scale 8 when laked in a definite (constant) volume of fluid.

(5) "Pig's serum is collected at a slaughter house and is used within twenty-four hours; it should be free from red corpuscles and hemoglobin tint. The quantity used is constant in volume and hemolytic power (against washed sheep's red corpuscles). As a rule, titration carried out in two sets of several tubes (one set with undiluted and the other with with diluted serum) shows whether or not the sample is sufficiently strong. Most pig's sera contain enough amboceptor and complement.

(6) "Sheep's corpuscles should be washed with saline solution and made up to the desired suspension. The patient's serum is

heated to 55° C. for 20 minutes just before being used in the test. It must be free from hemoglobin or corpuscles (centrifugalization is employed).

(7) "The following method is used: 'Every reagent must be contained in a constant volume (0.8 c.c.) of saline solution, except the patient's serum (0.2 c.c.). Spinal fluid is used unheated (1.6 c.c.). The tubes (11 mm. inner diameter) receive the patient's serum, perethynol suspension, and pig's serum, and are then placed in a thermostat (37° C.) for seventy-five minutes. At the end of incubation, sheep's corpuscles are added to all, and these are once more incubated at 37° C. for hemolysis, which is usually complete in from twenty-eight to thirty minutes. Those tubes which show partial hemolysis are at once centrifugalized, and the intensity of tint in the supernatant fluid is read with the aid of the artificial colorimeter. Appropriate controls are provided.'

(8) "A chart system of recording the colorimetric determinations on different occasions is kept for every patient, and is called by Vernes, "syphilimetrie". The chart is marked with the grades of tints from 0 to 8. He claims that the absence of the reaction beyond eight months after cessation of the treatment indicates a permanent cure of syphilis.

(9) "Incidental to this method, Vernes devised a rheometer (for measurement of a definite amount of serum) and an aspiropipeur (a syringe which aspirates a liquid from a container and forces it out by a piston into the test-tubes) for distributing a given quantity of reagent to a large number of test tubes in rapid succession."

Einthoven, W. and Hugenholtz, F. W. N.: Electrogrammes existant en l'absence de toute contraction visible du coeur. *Nederlandsch Tijdschrift voor Geneeskunde,* 1919, i, p. 310; abstr. *Archives des maladies du coeur,* Feb., 1920, xiii, No. 2, p. 82.

It is probable that electrical phenomena precede muscular phenomena and the two may be independent. Several authors have published tracings for hearts intoxicated with KCl, muscarin, antiarin, digitalin, which show electrocardiograms, even when the muscle is completely arrested.

Experiments were made on frog hearts in which very delicate diapositives were used. Tracings of the auricles and ventricles were projected upon the same plate with the electrocardiogram.

The installation of KCl diminished the amplitude of the pulsations in three tracings. It was necessary to augment only the vibrations of the apparatus in order to make the muscular pulsations disappear on the tracings. "It seems that the parallelism between the electrocardiogram and the muscular tracings is destroyed, and that the persistence of the former during the immobility of the heart is due simply to the fact that the apparatus is not fine enough to register faint contractions."

Fukuhara, Y., and Yoshioka, M.: A New Method of Testing Antityphoid Serum. *The Journal of Immunology,* Sept., 1919, iv, No. 5, 285-98.

No antibodies have heretofore been discovered in antibacterial sera whose quantitative determination could be used as a measure of therapeutic value. Yet many anti-infectious sera can be quantitatively titrated with the use of animals. The usual method has been to inject the serum into the peritoneal cavity in varying quantities, combined with 10 lethal doses of a living virulent culture of the bacteria. The quantity of the serum which was just able to protect the animal against 10 lethal doses was called by Pfeiffer the titer or immunity unit of the serum. In typhoid it has been customary to use strains of such virulence that from 1/5 to 1/10 of 1 *oese* could kill a guinea pig in twenty-four hours. This method of testing antityphoid sera (illustrated in a table) is obviously unreliable, since the result of the determination of protective value depends, here, upon the strain of bacteria employed.

The authors' experiments demonstrate the need of a constant standard of protective value, which could only be established with the use of a constant unit of the typhoid culture. They arrived at this constant unit in the following manner:

Varying amounts of antityphoid serum 180 were mixed with 10 lethal doses of an agar culture of the typhoid strain Takayama, and these mixtures were injected intraperitoneally into guinea pigs. It was found that 1 gram of the dry serum contained 4410 protective units (1 unit being just sufficient to protect an animal from death). The minimal lethal dose of the strain employed was about ¾ of an *oese*. Several animals were used, to exclude individual differences.

In their experiments to demonstrate whether, in the standardization of the antitoxic sera, a constant measure of protective power could be determined in the various typhoid cultures, with the use of the arbitrary standard protective unit, the authors adopted the symbols L+dose and L_0 dose. The L_0 dose is the largest amount of living bacteria which, when mixed with the protective unit, and intraperitoneally injected, did not cause death in a guinea pig weighing from 250 to 300 grams. The L+ dose is the smallest amount of typhoid bacteria which, under the same conditions, caused the death of the animal within twenty-four hours.

The L+dose (or L_0 dose) was mixed with different amounts of the serum to be tested, and the mixtures were injected intraperitoneally into guinea pigs. The results (given in tables) show that the method possesses considerable reliability. In spite of the wide variation in the L+ dose of the different strains of bacteria, the determined protective value of the antisera was practically the same, whatever strain was used in the test. The use of the L_0 dose is not practical and the authors prefer to use the L+ dose.

To illustrate this method, if the L+ dose is 0.001 c.c., then 1 c.c. of the serum contains 1,000 protective units.

The standard serum is preserved in the dry state in Ehrlich tubes. When a new standard serum is to be tested, a tube of the old standard serum is opened and the contents are diluted with glycerin water so that 1 c.c. of the fluid contains exactly 10 protective units. With this diluted serum the L+ dose of a typhoid bacterial culture is determined, and this dose is, in turn, employed to estimate the protective value of the new standard serum.

The L+ dose of typhoid bacteria is a uniform criterion for determining the protective value of antityphoid serum obtained from any strain of typhoid bacteria. The virulence control is not necessary in every test. It would be advantageous to use a culture which would maintain its properties for a considerable time. However, typhoid cultures constantly diminish in virulence, especially if kept in the ice-box without being transplanted. In order to prevent variations in the test doses, it is advisable to transplant the cultures every three or six weeks and to preserve them at a low temperature.

The falling off of the virulence of cultures cannot be prevented by animal passage. The constancy of the L+ dose cannot be maintained by this means.

The authors' experiments show that the simultaneous testing of the same serum with different strains of typhoid bacilli lead to the same value. They therefore assume, unlike Pfeiffer and Strong, that the receptors of different typhoid strains possess no specific differences with respect to the protective antibodies, and that each kind of partial antibody corresponds with a common haptophore group of the bacterial protoplasm. The differences in the binding power, i. e., in the size of the lethal and L+ doses, are not due to a dissimilarity of the receptors but to differences in their number and avidity with respect to the antibodies.

The authors conclude: "The general adoption of our method and particularly of our protective unit, will naturally permit, for the first time, a quantitative comparison of the antityphoid sera prepared with different strains and in different laboratories.

VERNES, A.: Qu'est la Sero-reaction de la Syphilis. *La Presse médicale,* June 19, 1919, xxvii, No. 34, pp. 333-4.

The author explains the measurement, in blood serum, of a particular power, that of flocculence. A liquid is unclear when it contains particles in suspension. In a test-tube which is not disturbed the particles settle; they settle more quickly if the tube is centrifuged. When precautions are taken against coagulation, centrifugation also enables one to extract the hematids of the blood. They can then be washed and kept in salt solution, where they form a turbid red liquid. After centrifugation the deposit forms a red layer at the bottom of a tube of clear liquid. But the hematids are fragile, and liquefaction takes place in the salt solution. This is called hematolysis. Partial hematolysis may take place, and the nuances of color in the fluid can be observed colorimetrically.

In testing serums, suspensions of perethynol may be used. The most stable of these suspensions are almost limpid; the least stable are milky. The intermediate suspensions run the gamut of opalescences, which may be scaled exactly. The stability of all the nuances of opalescence can be augmented by substances which oppose the joining together of the granules. Pig serum is one of the substances possessing this dispersing power. On the other hand, the stability of a suspension may be diminished by substances which increase flocculation. One of these substances is human serum. Flocculation increases the opacity of the fluid; the flocculent masses become visible to the naked eye, and eventually collect at the bottom of the tube, leaving the supernatant fluid clear.

By carefully balancing small quantities of dispersing serum against small quantities of flocculent serum, in a suspension of perethynol, it is possible to calculate the resistance of the suspension to flocculation. The colorimetric scale can be graded into fine nuances of difference in opalescence.

Syphilis increases the flocculating power of the normal serum. The syphilitic serum reaches high levels on the scale of sensibility to flocculation while the normal serum never passes a certain low level. (Illustrative graphs are given). A curve for a syphilitic serum, showing the levels in various phases of the disease, will rise and fall sharply, and present an entirely different appearance from the plateau curve for normal serum examined under the same conditions. The oscillations of the syphilitic curve are due to fluctuations in the degree of infection, and therefore of flocculating power, under treatment. It is therefore possible to trace the development of the disease exactly by the fluctuations of the curve, observations being taken at regular intervals.

In comparison with his own method the author finds the Wassermann antigen test inconclusive.

SMITH, J. W.: Reaction of Leukocytes after Vaccination with Army Triple Typhoid Lipovaccine. *Journal of the American Medical Association,* Jan. 25, 1919, lxxii, No. 4, pp. 257-9.

The results of French investigators with typhoid vaccines have been, in brief, as follows: "Vaccination with the various vaccines T. A. B., whether given subcutaneously or intravenously, and whether ether-killed or heat-killed, is followed by a very rapidly appearing polynuclear leukocytosis, which reaches its maximum within from four to eight hours and disappears within forty-eight hours. In some cases it is followed by a mild leukopenia marked by a relative mononucleosis."

The author's study was for the purpose of determining the reaction of the white blood-cells in individuals vaccinated with the Army triple typhoid lipovaccine. The subjects were 4 healthy young men from the Army Medical School. Before the vaccine was administered, leukocyte counts were made on four successive days, in order to establish the normal figures for each individual. On July 20, each subject received 1

c.c. of lipovaccine, containing 0.4 mg. (1/64 grain) of the dried bacterial substance of *Bacillus typhosus, Bacillus paratyphosus A* and *B*. Some of the subjects had been vaccinated previously and 2 had had typhoid fever, six years and eight years before, respectively. The subjects reported daily for examination, as nearly as possible at the same hour every day.

Blood was drawn by puncture of the finger tip or lobe of the ear with an ordinary spring lancet. The blood was allowed to reach the 0.5 mark of the pipet, and the diluting fluid, 2 per cent solution of acetic acid in distilled water, was drawn to the 11 mark. The mixture was thoroughly shaken and, in most instances, counted within the succeeding hour, being shaken again immediately before the counting. The Thoma hemacytometer was used, and the cells in the four corner squares and in any one of the other squares was counted. This sum was multiplied by 40 (2 for the full cu. mm., and 20 for the dilution). Only one drop from each pipet was counted, as a rule. Whenever a count seemed exceptionally high or low, it was verified by the examination of a second drop. The spreads were made on slides, dried in the air, and stained with Wright's modification of the Romanowsky stain. Composite graphs and tables were made.

Results.—The average normal white-cell count for the series was 7,224.2. This rose on the day after vaccination to 11,758.9, then fell again to 6,575.6 on the eighth day. Then followed an undulant rise and fall covering thirteen days, reaching its highest points, 8,184.4 and 8,331.1, on July 29 and August 3 respectively. On August 8 the count was 6,884.7, and thereafter it remained normal.

The average number of leukocytes for the nineteen days following vaccination was 7,872.4, and for the remainder of the period tested, the average count was 7,122.9. The average normal percentage of polymorphonuclear neutrophils was 60.6. It rose on the day after examination to 76.1, but fell to 60.8 by the third day. It remained about 60 for the rest of the time, falling below 60 only once. For July 26, concomitant with a leukocyte count of 6,575.6, the percentage was 57.2. (A graph and table are given).

The author summarizes his conclusions as follows:

"Subcutaneous injection of the triple typhoid lipovaccine is succeeded by a rapidly appearing polymorphonuclear neutrophil leukocytosis which gradually disappears during a period of from four to six days, and reappears immediately thereafter for a period of from seven to fourteen days. In exceptional cases the initial leukocytosis and the secondary leukocytosis, one or both, are followed by a mild degree of leukopenia with mononucleosis; but in the majority of cases vaccination with the lipovaccine does not lead to diminution in the number of leukocytes or of the percentage of polymorphonuclear neutrophils but, on the contrary, actually induces a polymorphonuclear neutrophil leukocytosis of varying degree, over a period of approximately two weeks."

Luckhardt, A. B., Philips, H. T., and Carlson, A. J.: Contributions to the Physiology of the Stomach. LI. The Control of the Pylorus. *American Journal of Physiology,* 1919, l, p. 57.

It has been customary to accept the explanation of Cannon that the pylorus is under the influence of the acid chyme. Attention is called to the fact that Cannon himself stated that other factors might modify the chemical control, especially under normal conditions. He never was able to explain convincingly the rapid exit of water and neutral egg white solution, which left the stomach before the free acidity of the intragastric contents was present to effect an opening of the pylorus or to close it after ejection into the duodenum.

After reviewing the testimony of various investigators in this field the results of specific experiments are reported as carried out by the authors. They find that there is a correlation between marked motor activity

of the stomach (either as tonus changes or as peristalses) and an inhibition in tone of the plyoric sphincter. Under the special conditions described in their experiments the intragastric contents issuing from the duodostomy were usually acid toward phenolphthalein, but rarely showed the presence of free acidity to dimethylamido-azobenzene of Congo-red. Alvarez has shown that under normal conditions the stomach wall follows gradients of irritability, rhythmicity and latent period from cardia to pylorus. With a gradient higher in the body of the stomach than near the pylorus the increased pressure coming from above effects an opening of the pylorus even before the free acidity has reached a concentration sufficient to assume chemical control of that sphincter. It seems probable that even under normal conditions the chemical control has been greatly over-emphasized, to the exclusion of other possibilities. There is certainly a greater relation between the muscular activity and the opening of the pylorus than between the latter and the reaction of the gastric contents. Vomiting is also more easily induced by irritating duodenal mucosa than by an irritation of the gastric mucosa.

Krabbe, K. H.: Nyere Undersogelsen over den disseminerede Skleroses Aetiologi. *Ugeskrift for Laeger,* Nov. 7, 1918, 80 aargang, No. 45, p. 1,772.

The author gives a general view of the relatively few works which exist on experimental examinations to determine the etiology of disseminated sclerosis, *i. e.,* the examinations of Bullock, Ceni and Besta, Jurgens, Siemerling and Raecke, Simons, Steiner and Kuhn. The results are contradictory, and none of them prove that disseminated sclerosis is an infectious disease. The author himself has made a few inoculations of spinal fluid from patients with disseminated sclerosis in monkeys (macaque) and rabbits; the results were negative. In spite of these negative results he considers that it is most probable that disseminated sclerosis is infectious, and suggests that long series of inoculations from acute stages of disseminated sclerosis perhaps would give positive results.

Pappenheimer, A. M., and Vance, M.: The Effects of Intravenous Injections of Dichloro-ethylsulfid in Rabbits, with Special Reference to Its Leukotoxic Action. *The Journal of Experimental Medicine,* Jan. 1, 1920, xxxi, No. 1, p. 71.

There is evidence pointing toward the general toxicity of dichloro-ethylsulfid (mustard gas), both when administered by inhalation and when injected subcutaneously or intravenously. An emulsion was prepared in 30 per cent alcohol in distilled water. This suspension was prepared from recently made, accurately weighed, 10 per cent solution in absolute alcohol, and immediately injected to avoid hydrolysis. The dichloro-ethylsulfid was a distillate from the contents of a German yellow cross shell.

The lethal dose of dichloro-ethylsulfid injected intravenously into rabbits was found to be from 1/12 to 1/6 grain (from 0.005 to 0.01 gram) per kilo. Rabbits dying within twenty-four hours showed extensive hemorrhages and edema of the lungs. About one-third of the rabbits showed severe lesions of the intestinal tract. Injected intravenously, the drug was specifically poisonous for the hematopoietic tissues. Severe lesions were caused in the bone-marrow, and the number of circulating leukocytes was markedly diminished. In animals surviving the injection regeneration occurred. The granular cells of the bone-marrow seemed to be more sensitive than the lymphoid cells or than the erythrocytes. The effect upon the blood and hematopoietic tissues was not due to the admixture of nitrobenzene or chlorobenzene in the shell filling, as injection of these substances in amounts many times greater than the total dose of dichloro-ethylsulfid used produced no changes in the blood picture, and the subsequent injection of dichloro-ethylsulfid produced typical reactions.

Kendall, E. C., and Osterberg, A. E.: The Chemical Identification of Thyroxin (2nd paper). *Journal of Biological Chemistry,* 1919, xl, 265.

The second of the papers describing in detail the character and methods of identification of the iodin compound of the thyroid is too detailed for an abstract, but the following summary indicates some of the most important findings:

(1) Thyroxin is a colorless, odorless, crystalline substance, insoluble in aqueous solutions of all acids, including carbonic. It is soluble in sodium, ammonium and potassium carbonates. It forms salts with heavy metals and also with acids.

(2) The iodin content of thyroxin is 65 per cent and that of the sulfate is 60 per cent. The molecular weight is 585. Ultimate analysis and study of derivatives show that the structural formula is 4, 5, 6 trihydro-, 4, 5, 6, tri-iodo-, 2 oxy- beta indolpropionic acid.

(3) In the presence of alkali metal hydroxids, thyroxin forms dibasic salts through the carboxyl and hydroxyl groups.

In the presence of carbonates it forms monobasic salts with the carboxyl group alone. The imino-group forms salts with mineral and formic acids, but not with acetic. The salts of mineral acids are soluble in alcohol, but no acid salt of thyroxin is appreciably soluble in water. Thyroxin forms derivatives through the aminonitrogen, such as acetyl and ureid, and through its carboxyl and hydroxyl groups, such as the dimethyl derivative.

(4) Thyroxin exists in four distinct forms: (*a*) the keto form with the amino carbonyl groups, melting point 250° F. (118.94° C.); (*b*) the enol form in which the hydrogen migrates from the amino to the carbonyl, forming the hydroxyl group, melting point 204° F. (95.56° C.); (*c*) an open ring form in which the elements of water enter the molecule between the amino carbonyl groups, forming an open ring structure with amino and carboxyl salt forms, melting point 225° F. (107.19 C.); and (*d*) a tautomeric form of this in which the elements of water added to the nitrogen make the amino hydrate form, melting point 216° F. (102.22 C.). If an acid is added to an enol form of thyroxin, the ring opens and the acid forms an amino-acid salt. The reason why weak organic acids, including carbonic, can combine with the nitrogen of thyroxin-forming amino salts is that the ring is unstable in neutral aqueous solutions and the nitrogen tends to exist in the pentad state, with the addition of either the elements of water, forming an amino hydrate, or a carboxyl group, forming an amino salt. These reactions could occur only with a strongly basic group. The amino group of anilin and imino group of indol or isatin are too feebly basic to react like thyroxin with weak organic acids.

(5) Thyroxin is not easily oxidized or reduced, but will yield to both oxidation and reduction if sufficiently strong reagents are used.

(6) In alkaline solutions the iodin is broken off from the thyroxin molecule as hypoiodous acid, not as free iodin. This reaction is accelerated by sunlight. Sunlight also produces pink color compounds from the colorless thyroxin molecule.

Kleiner, I. S.: The Action of Intravenous Injections of Pancreas Emulsions in Experimental Diabetes. *Journal of Biological Chemistry,* 1919, xl, 153.

This is an important paper, summarizing the work in the field up to date and giving the results of many experiments in this connection. In the experiments a simple unfiltered water extraction of fresh pancreas was adopted, with subsequent dilution with saline (0.9 per cent NaCl). The preparation was introduced by the venous route very slowly and over an appreciable period. The results produced were a temporary but marked decrease in the glycemia and glycosuria. There was no compensating increase in the urinary sugar, but rather a decrease, which may be partly due to temporary toxic

renal effects. The results could not be attributed to Na_2CO_3 as in the case of the Murlin-Kramer experiments, because of the method employed. The author considers these results as further evidence of the internal secretion theory of experimental diabetes.

MANN, F. C.: A Study of the Tonicity of the Sphincter at the Duodenal End of the Common Bile-duct. (With special reference to animals without gall-bladders). *Journal of Laboratory and Clinical Medicine,* Nov., 1919, v, No. 2, p. 107.

The article deals with a comparison of the tone of the sphincter in animals with gall-bladders as compared with those without. Mann's work showed that in animals possessing gall-bladders the sphincter was usually able to withstand a minimum pressure of from 75 to 100 mm. water, while in those animals which lacked gall-bladders the sphincter would withstand pressures of less than 30 mm. water only. Both species were shown anatomically to have a sphincter, but in those animals which did not have gall-bladders the sphincter does not seem to have functionated appreciably.

Previous work on the function of the gall-bladder has shown that cholecystectomy is usually followed by dilatation of all the extrahepatic ducts, thus implying that there is some relation between the action of the sphincter and that of the gall-bladder.

HARDING, V. J., AND YOUNG, E. G.: Placental Feeding and Purin Metabolism. *The Journal of Biological Chemistry,* 1919, xl, p. 227.

From comparative feeding experiments on young dogs with equivalent diets containing muscle protein and placental protein, the excretion of allantoin was found to rise markedly on the placenta diet. The excretion of uric acid parallels that of allantoin and the conclusion is drawn that the comparatively large amount of arginin present in placental diet is responsible for the increase in purin metabolism.

The authors also report a modification of the Plimmer and Skelton method of determining allantoin.

MILLS, C. A.: A Note on the Question of the Secretory Function of the Sympathetic Inervation to the Thyroid Gland. *American Journal of Physiology,* 1919, l, p. 174.

By the use of cocaine the author concludes that the sympathetic fibers to the thyroid gland lack a secretory function.

MEIGS, E. B., BLATHERWICK, N. R., AND CARY, C. A.: Further Contributions to the Physiology of Phosphorus and Calcium Metabolism of Dairy Cows. *Journal of Biological Chemistry,* 1919, xl, p. 469.

This is an interesting, important contribution to experimental methods in this field whose principal development is the expression of opinion that a persistent negative calcium balance under the conditions of a balance experiment and the disturbance of calcium assimilation in such experiments is much more marked than is either phosphorus or nitrogen assimilation. The results also indicate that phosphorus assimilation is favored by feeding experiments, since even though the cows fed the experimental ration were more disturbed than the controls they assimilated phosphorus uniformly more rapidly than the controls. The value of experimental feeding for increased calcium assimilation is also demonstrated, but in these cases the controls assimilate actually more that the others, due to the profound disturbance produced by the experimental procedure. The authors do not believe experimental feeding to be unfavorable to nitrogen assimilation.

They find that there is a connection between phosphate feeding, the concentration of inorganic phosphorus in the blood-plasma,

and the amount of phosphorus excreted in the urine, but that the latter does not depend entirely upon the concentration of inorganic phosphorus in the plasma. What this other factor may be is uncertain, but it may be connected with the acid base equilibrium of the body. The amount of calcium excreted in the urine is largely independent of the concentration of calcium in the blood-plasma. In these experiments there was an inverse relation between the amounts of calcium and phosphorus excreted in the urine but the authors believe that this relation is easily disturbed by other influences, particularly the relation between the acids and bases of the ration.

The feeding of grain and hay on alternate days, and the addition of disodium phosphate to the grain definitely favors the assimilation of phosphorus by pregnant cows and probably that of calcium also.

Atkinson, H. V., and Lusk, G.: Animal Calorimetry. The Influence of Lactic Acid upon Metabolism. *Journal of Biological Chemistry,* 1919, xl, p. 79.

The author gives a further contribution to the problem of the increase in heat production after meat ingestion, due to the stimulus provided by the acid productions of protein metabolism. The reasons for the specific dynamic action as outlined by authors in previous papers is reviewed. The present paper reports experiments undertaken to determine whether or not ingested lactic acid given to a dog might cause an increase in heat production comparable to that produced by ingested alanin. The results showed:

(*a*) 2.5 grams of Liebig's extract of beef dissolved in 500 c.c. of water facilitates the retention by the stomach of this quantity of fluid by a dog weighing about 11 kilos. At times it also prevents the regurgitation of 500 c.c. of a 1.6 per cent solution of lactic acid.

(*b*) The quantity of heat produced by the dog after the ingestion of 2.5 grams of Liebig's beef extract dissolved in 150 c.c. of water is the same as that of the basal metabolism, but when the mass of fluid reaches 500 c.c. there is an increase of 1 calory per hour, during which experimental period the urine eliminated averages about 100 c.c. After this factor has been allowed for, it appears that the increased heat production, after 8 grams of d-l-lactic acid have been given, is 2.1 and 1 calories and is comparable to that obtained after 8 grams of d-l-alanin have been given, *i. e.,* 1.5 calories.

(*c*) Following the administration of 8 grams of glucose in 150 c.c. of water there is no rise whatever in the basal metabolism. It seems improbable, therefore, that either lactic acid or alanin are normally produced in any quantity from ingested glucose.

Levene, P. A.: Crystalline Salts of Uridin-phosphoric Acid. *Journal of Biological Chemistry,* 1919, xl, p. 395.

Attention is called to the fact that the identification of a nucleotid in the form of its brucine salts is not sufficiently reliable and to the desirability of finding such salts as may be readily crystallized when the experimenter is in possession of only a small quantity of material. The paper describes the preparation of several such salts, namely, the mono- and di-ammonium salts of uridin-phosphoric acid, the neutral lead salt and the brucine salt prepared from the crystalline ammonium salt, the latter prepared to establish constants of compounds.

Moore, W., and Hirschfelder, A. D.: An Experimental Study Upon the Impregnation of Cloth With Pediculicide Substances. *Journal of Laboratory and Clinical Medicine,* Sept., 1919, iv, No. 12, p. 707.

Many experiments were tried, to determine the best pediculicide to free the soldiers from lice. The experiments included the use

of organic acids, mineral and vegetable oils, metallic salts, sulphur, iodoform, cresol, chlorin, bromin, and compounds, containing several ingredients. The results showed that the substances which were best suited to the purpose were the dibrom-metacresol, which lasted ten days, and the dichlormonobrom-metacresol, which lasted thirteen days.

Moore, L. M.: Experimental Studies on the Regulation of Body Temperature. *American Journal of Physiology,* 1919, l, p. 102.

This preliminary report supports the view that temperature regulation is dependent upon physicochemical factors witout the intervention of hypothetical heat-centers. It demonstrates a rise in body temperature comparable to hyperthermia following puncture of the brain by increasing intracranial pressure with water.

Hiller, A., and Van Slyke, D. D.: Direct Determination of Non-amino Nitrogen in the Products of Protein Hydrolysis. *Journal of Biological Chemistry,* 1919, xxxix, p. 479.

The previous method has been to subtract the aminonitrogen estimated by the Van Slyke method from the total nitrogen estimated by the Kjeldahl method. The present method presents a means of estimating the nonaminonitrogen by a single, direct determination. For details of the method the reader is referred to the original paper. The method consists in applying special treatment to the monoamino-acid fraction of the products of protein hydrolysis, as analyzed by the method of Van Slyke. The aminonitrogen is removed by warming with sodium nitrate and hydrochloric acid, the excess of nitrous acid is reduced with a zinc-copper couple by the Scales method and the nonaminonitrogen in the residue is determined by Kjeldahl. Results by this method, however, agree in the main with the indirect method, indicating that results of practically the same degree of accuracy may be obtained by the original, somewhat simpler indirect method, as by the new direct method.

Mitchell, H. H.: On the Identity of the Water-soluble Growth-promoting Vitamine and the Antineuritic Vitamine. *Journal of Biological Chemistry,* 1919, xl, p. 399.

This paper contains no new experimental evidence but is an excellent review of the work on the "B" vitamine. It brings out the necessity for further work to determine whether or not the "B" vitamine, which causes growth, is antineuritic. The identity of the two is always assumed, since the sources and methods of extraction are the same, but there is conflicting evidence as to their identity; the author has analyzed the various experiments in such a way as to bring out the weakness of the assumption and the need for more experimental work in this direction.

Asada, H.: Vital Staining and Acidosis. *American Journal of Physiology,* 1919, l, p. 20.

Experiments are reported to show that vital staining by injection of lithium carmine soluton is not due to staining of the specific cellular granula but to the phenomena which takes place in the organism as a result of acidosis, caused by the carmine injection. They establish the fact that a single intravenous or intraperitoneal injection of lithium carmine in subtoxic doses in a healthy animal will not stain unless acidosis is first established. An actual decrease in plasma bicarbonate occurs in animals vitally stained. Hence the conclusion is drawn that it is incorrect to predicate the existence of specific stain-taking granula in the cells. Vital staining with lithium carmine is rather due to the development of an acidosis which so alters the function of the body cells that the dye diffusing it is deposited in granula. This deposition corresponds to the precipita-

tion from colloidal solution of the dye when the normally alkaline solution is made acid *in vitro*.

Coca, A. B.: Anaphylaxis Reaction in the Rabbit. *Journal of Immunology,* July, 1919, iv, No. 4, p. 219.

In acute anaphylactic shock in the rabbit, whether induced by means of cells (corpuscles) or by means of dissolved protein, and after both passive and active sensitization, an occlusion of the pulmonary vessels is constantly observed.

Experiments with dissolved corpuscles and with primarily toxic serum indicate that this occlusion is not embolic, but is due to a contraction of the muscular coat of the arteries comparable with that of the bronchial musculature in anaphylactic shock in the guinea pig.

The local phenomenon of Arthus, and the cachexia of the rabbit observed by the same author, appear to be the result of a similar interference with the circulation.

Levene, P. A.: The Structure of Yeast Nucleic Acid. IV. Ammonia Hydrolysis. *Journal of Biological Chemistry,* 1919, xl, p. 415.

This article reviews the author's previous work on the theory of nucleic acid structure and that of Thannhauser and Jones. On the basis of the results of a method of hydrolysis which consisted in heating the nucleic acid in a 2.5 per cent aqueous ammonia solution for one hour at 100° C., and of a study of the fractions, the author holds that the findings nullify the experimental evidence in support of the theories of Thannhauser and Jones as to the mode of linkage of the mononucleotids. He admits, however, that their work has been of great importance in furnishing further proof of the nucleotid structure of yeast nucleic acid and in making it possible to show that the molecule of nucleic acid is readily decomposed into mononucleotids and that the linkage between all nucleotids is of the same order. The experimental work is given in detail.

Levene, P. A., and Rolf, I. P.: Cephalin. VII. The Glycero-phosphoric Acid of Cephalin. *Journal of Biological Chemistry,* 1919, xl, p. 1.

The article reviews the previous evidence for the presence of glycerophosphoric acid in cephalin, and its lingake, and also the claim of Frankel and Dimitz that the glycerophosphoric acid from cephalin is an isomer of that from lecithin, being dextrorotary while that from lecithin is levorotary. The experimental work deals with the author's extraction of glycerophosphoric acid from both cephalin and lecithin. The results contradict those of Frankel and Dimitz establishing the identity of the glycerophosphoric acid in the two compounds. They explain the error of Frankel and Dimitz as due to the behavior of the crude barium glycerophosphate. That from lecithin is always levorotary, while that from cephalin shows a dextrorotary property. The magnitude of the dextrorotation shows a dextrorotary property. The magnitude of the dextrorotation in the latter, however, successively descends on purification. All the dextrorotary compounds were also found to contain nitrogen, and the purification of the substance that led to the fall in the dextrorotation also led to a diminution in the nitrogen content. The author suggests that the error of Frankel and Dimitz was probably due to contamination of the product which they analyzed by some product of the intermediary hydrolysis.

Hyman, L. H.: Physiological Studies on Planaria. II. Oxygen Consumption in Relation to Regeneration. *American Journal of Physiology,* 1919, l, p. 67.

On the assumption that the conclusions of Child are true, *i. e.*, that the process of re-

generation is a rejuvenating process, restoring the organism to a metabolic condition comparable with that of young organisms, it was held that the oxygen consumption of regenerating worms should show an increase over that of the unregenerating forms. The experiments reported in this paper confirm this view and indicate that the increase is associated with the activity of the cut surfaces. The increased rate in regenerated worms is due not only to the high metabolic rate of the regenerated tissue but also in part to an acceleration of the rate of oxygen consumption of the old tissue comprising the original pieces. In other words, when a piece of planaria undergoes regeneration its metabolic rate is accelerated but is not, however, as high as that of the regenerated regions. The measures taken to control the results are given in detail.

Sherwin, C. P., and Helfland, M.: Comparative Metabolism of Certain Aromatic Acids. III. Fate of *P*-nitrophenylacetic Acid in the Organism of Fowl, Dog and Man. *Journal of Biological Chemistry,* 1919, xl, p. 17.

The paper first reviews the general purpose of the experiments, namely, to determine how the body disposes of certain organic substances, and calls attention to previous results, noting that these methods with animals often differ from those with the human species; it deals experimentally with the fate of *P*-nitrophenylacetic acid in man, dog and fowls. The conclusions follow:

(*a*) *P*-nitrophenylacetic acid was ingested by a man in 77.16 grain (5 gram) doses; 68.70 per cent of the acid was recovered from the urine in an uncombined state. No compound of the acid was found in the urine.

(*b*) *P*-nitrophenylacetic acid was fed to a dog in 77.16 and 108.1 grain (5 and 7 gram) doses; 61.47 per cent of the acid was isolated from the urine. Of this amount, 44.35 per cent was in the uncombined state, while 17.12 per cent was combined with glycocoll and excreted as *P*-nitrophenaceturic acid.

(*c*) *P*-nitrophenylacetic acid was fed to a hen in 15.13 grain (1 gram) doses. Some of the acid was excreted in an uncombined state, but the greater portion was conjugated with ornithin and excreted as *P*-nitrophenacetornithinic acid. This acid was isolated, analyzed and its structure determined. The Ba, K and Na salts of the compound were prepared and found to be dextrorotary.

Koessler, K. K., and Hanke, M. T.: Studies on Proteogenous Amins. III. A Quantitative Method for Separating Histamin and Histidin. *Journal of Biological Chemistry,* 1919, xxxix, p. 521.

It is pointed out that the study of the metabolism of histidin has been difficult because of the lack of a proper quantitative method for estimating imidazole derivatives. The method devised by the authors was described in the previous paper. The present paper deals with proof that it can be applied to mixtures of imidazoles and that the exact amount of histamin, histidin and methylimidazole in such mixtures can be rapidly and accurately determined.

Koessler, K. K., and Hanke, M. T.: Studies on Proteogenous Amins. II. A Microchemical Colorimetric Method for Estimating Imidazole Derivatives. *Journal of Biological Chemistry,* 1919, xxxix, p. 497.

The method described in detail in the paper is based upon the interaction between the imidazole ring and *P*-phenyldiazonium sulfonate. As applied by the authors it (a) can be applied directly to practically any imidazole derivative, (b) gives equally good results on mixtures or on pure solutions of imidazoles and, (c) will estimate with a fair degree of accuracy as small an amount as 0.00001 gram of any of the imidazoles. Furthermore, a laborious series of dilutions is unnecessary, and the first determination is usually a reliable index of the quantity of imidazole present. The method was test-

ed upon histidin, histamin, imidazolepropionic acid, imidazole-acetic acid and methylimidazole. Tables are given for the direct determination of quantities of these substances ranging from 0.000001 gram to 0.00005 gram, and the amount of imidazole in any quantity of liquid can then be determined, by multiplication, with an accuracy of from 0.5 to 3 per cent. A list of substances is also given, some of which do and others of which do not interfere with the determination.

Koessler, K. K., and Hanke, M. T.: Studies on Proteogenous Amins. IV. The Production of Histamin from Histidin by *Bacillus Coli Communis*. *Journal of Biological Chemistry*, 1919, xxxix, p. 539.

Attention is called to the fact that an apparently simple chemical process, the decarboxylation of amino acids to exceedingly potent substances of amin structure, is of great theoretical and practical interest. The relation of this problem to the general nutrition of bacteria, to the metabolism of amino acids in the mammalian organism, to the pathology and pharmacology of the smooth muscle-fibre system, and to the chemical constitution of the products of the glands of internal secretion, mark it as a fundamental inquiry of biology. The present paper deals with the exposition of the optimum conditions for the conversion of histidin to histamin by the colon bacillus. Their experiment showed that: (*a*) When the colon bacillus is allowed to metabolize histidin, either alone or in the presence of nitrates or ammonium salts, histamin is not formed. (*b*) In a medium containing histidin and glycerol, but no nitrates or ammonium containing histidin and glycerol, but no nitrates or ammonium salts, histamin is not formed. In this case imidazole propionic acid appears to be formed, but only when the bacillus is formed to grow anaerobically. (*c*) In a medium containing histidin, glycerol, or glucose and a source of nitrogen, either KNO_3, NH_4Cl, or both, about 50 per cent of the histidin is converted into histamin in the course of two weeks, when oxygen is present. In the absence of atmospheric oxygen, this and all other metabolic activities of the bacillus are greatly reduced, probably because the colon bacillus is an aerobic organism by preference. (*d*) The production of histamin is always coincident with the production of an acid that is distinctly acid. The authors believe that the histamin is formed by the bacillus to neutralize the excess of acidity that is simultaneously produced from the glycerol. (*e*) Their results contradict the statements of texts and literature that carbonhydrates prevent the formation of histamin from histidin, since they find that the former is never formed except in the presence of an easily available source of carbon such as glycerol or glucose.

Greene, C. W.: Biochemical Changes in the Muscle-tissue of King Salmon during the Fast of Spawning Migration. *Journal of Biological Chemistry*, 1919, xxxix, p. 435.

Analyses show that: (1) the water content increases 6.6 per cent; (2) ash remains constant till the spawning station is reached; (3) fat furnishes the main energy supply, at a loss of 85 per cent; (4) phosphorized fats or lecithins are small in amount but are consumed in the journey, from 1.18 per cent, normally to 0.44 per cent; (5) organic extractives are increased in the late stages of migration. The ratio of extractives at spawning is only 50 per cent of the normal. The amino acids keep the muscle water on C. H. Greene's constant saturation level; (6) the protein content at the end of migration is 20 per cent, normally 20 per cent.

Jones, D. B., and Johns, C. O.: The Hydrolysis of Stizolobin, the Globulin of the Chinese Velvet Bean (Stizolobium Niveum). *Journal of Biological Chemistry*, 1919, xl, 435.

The work presents in addition to the statistical results a criticism of methods of

study of the hydrolytic products. The findings were as follows, as compared with Osborne and Clapp's findings for phaseolin:

Amino acids	*Per cent in stizolobin*	*Per cent in phaseolin*
Glycin	1.66	0.6
Alanin	2.41	1.8
Valin	2.88	1.0
Leucin	9.02	9.7
Prolin	4.00	2.8
Phenylalanin	3.10	3.3
Aspartic acid	9.23	5.3
Glutaminic acid	14.59	14.6
Hydroxy-glutaminic acid	2.81	...
Serin	0.67	0.4
Tryosin	6.24	2.2
Cystin	1.13	...
Arginin	7.14	4.9
Histadin	2.27	2.0
Lysin	8.51	4.0
Tryptophan	Present	...
Ammonia	1.55	2.1

A modification of the usual method of determining prolin is described. Aspartic acid was determined by the usual ester method, and by the recently published Dakin method. The latter gave 9.23 per cent yield as against 5.70 per cent by the older method. The Dakin method also gave 2.81 per cent hydroxy-glutaminic acid.

Osborne, T. B., and Wakeman, A. J.: Extraction and Concentration of the Water-soluble Vitamin from Brewer's Yeast. *Journal of Biological Chemistry,* 1919, xl, p. 383.

The authors call attention to the need in feeding experiments of vitamin solution that shall be as free as possible from nitrogenous substances, especially in the study of the nutritive value of individual proteins. They report a method for concentrating the water-soluble vitamin in a fraction of yeast, based on the insolubility of the "B" vitamin in absolute alcohol. For details of the method the original article should be consulted. Some of the essential features are as follows: fresh bottom yeast is obtained from a brewery, diluted with ice water and centrifuged. This process is repeated twice to thoroughly wash the sedimented yeast. This washed yeast (equivalent to 48 grams of dried yeast) is then stirred gradually into one liter of boiling distilled water containing 10 c.c. of 1 per cent acetic acid. After two minutes' boiling the solids are separated by centrifuge. After washing the residue once by boiling with 0.01 per cent acetic and again centrifuging, the extracts are united and concentrated to 500 c.c. This extract was found to contain less than one-fifth of the yeast solids and nearly all the "B" vitamin. This extract was next fractioned by successive treatments with alcohol and the fractions studied for vitamin content by feeding experiments on rats; e.g., the water extract was poured into enough 93 per cent alcohol to make the alcoholic content 52 per cent by weight and the precipitate (Fr. 1) removed and washed. The washings and filtrate were then concentrated and poured into 93 per cent alcohol to make the alcoholic content 79 per cent by weight. The precipitate formed (Fr. II) was washed once with 79 per cent alcohol dissolved twice by pouring into about 100 c.c. of H_2O and reprecipitated in alcohol of 90 per cent strength. The solutions from Fraction II were further concentrated, but results showed that Fraction II contained most of the "B" vitamin. As this fraction is easily prepared in large quantities it affords a better crude material for study than does autolyzed yeast filtrate, since by avoiding autolysis the proportion of water-soluble constituents of the extract is reduced to a minimum while the quantity of "B" vitamin in the mixture is apparently not diminished.

INTERNAL MEDICINE

WESSELHOEFT, C.: Mumps: A Review of Our Knowledge Concerning Its Etiology, Mode of Transmission, Incubation, and Period of Infectivity. *The Military Surgeon,* 1920, xlvi, 63-82.

Mumps is to military surgeons, at least, of much greater importance than is usually accredited, for it may deplete ranks as effectually as more formidable diseases. From 3 to 5 per cent of deaf-mutism is due to mumps. In 1915, of 50,000 deaf mutes in the United States Army, 1000 to 2000 owed their condition to mumps.

Etiology.—The causative factor is undetermined. There have been many attempts to isolate the organism in the past twenty-five years. Wollstein's work, offers the only definite contribution and this only so far as to show that the causative element can be transmitted with increasing virulence through successive inoculations in the cat. The theory that the contagion is contained in the saliva is confirmed.

Blood-serum, after the patients' recovery, has an inhibitory action on the virus. Hess (*American Journal Obstetrics,* 1915, lxxii, 183-185) reports that of 20 children inoculated with 6-8 c.c. of blood-serum from convalescent mumps cases, none contracted the disease, although fully exposed to it. A long incubation period favors administration as a prophylactic measure. There is reference to the use of serum in the treatment of the disease itself.

Mode of Transmission.—Transmission of the disease seems to be aided by the following direct and indirect contact: kissing; mother may pass contagion from child with prodromal symptoms on to other children; droplet infection (pipes, etc.); bedding and bedstands; fomites. Everything with which the hands or bedding comes in contact must be washed, dried and aired. Drying seems to hasten disinfection.

Incubation Period. (Unsettled State).—The ruling of boards of health and military authorities concerning isolation of contacts are conflicting. The incubation period ranges from three to thirty-five days or "longer"; the average varies from fourteen to twenty-five days.

As the disease is infectious before the salivary glands are appreciably swollen—in prodromal stage—and as missed cases are not infrequent, the precise date of infection is difficult to ascertain. All writers from 1869 to 1919 have observed that the greatest number of cases arrived at are average incubation period ranging from seventeen and five tenths to nineteen and five tenths days. The author gives the following table: 658 cases, average minimum incubation period eight days, average maximum thirty days, general average eighteen days.

Orr (*Journal Royal Army Medical Corps,* 1918, xxxi, 480) brings out (periodogram method) as definite an eighteen day cycle of periodic infectivity during an epidemic (902 cases). The practical bearing has to do with the isolation of contacts. When sporadic cases of mumps occur, it is advisible to isolate contacts from the fourteenth to the twenty-fourth day after exposure.

Period of Infectivity.—Wollstein's experiments are only laboratory evidence. He says (*Journal of American Medical Association,* 1918, lxxi, 639-644), "the period of infectivity of the mouth secretions, as far as this test is capable of indicating, is comparatively short and covers about one week, corresponding to the swelling of the parotid. A fresh swelling appearing in the opposite parotid gland would, of course, prolong the infectious period for a given patient".

There is abundant clinical evidence that mumps is contagious in the prodromal stage; many instances are cited in literature. In taking precautions to isolate all contacts, the prodromal stage of the patient should be considered to extend forty-eight hours previous to the appearance of parotitis.

The duration of infectivity is arbitrarily

set by different authors from four or five to twenty-five or thirty days. The general trend of experienced physicians is to be guided by the duration of symptoms. The writer considers this course advisable in army and in civil life. Such a period may warrant a release under 10 days. The retention of the mild cases of unilateral mumps, after the initial subsidence of the gland, to watch for further glandular involvement is not justified in the Army during an epidemic. With sporadic cases twenty-one day quarantine dating from the onset of the symptoms would be safest and most economical.

As to the problem of parotid hypertrophy following mumps (cases reported lasting up to one year), Wesselhoeft formulates the theory that persistent enlargement after subsidence of acute symptoms is the result of a secondary infection of the gland with a walling-off process. This view is borne out by the fact that the pathology of the tissues affected by mumps virus in other parts of body is characterized by a tendency to atrophic degeneration rather than hypertrophy after acute stage.

In December, 1918, and January, 1919, when quarantine of mumps in the A. E. F. was according to duration of symptoms—8 to 12 days—the incidence of mumps in the 202nd Infantry did not apparently increase. Contacts were not isolated at this time. However, the epidemiological factor must be taken into account, as at that time, the Army was well along in the second year of the war.

The author gives a bibliography of eighty-one references from all literatures.

Van Der Scheer, W. M.: Beitrag zur Kenntnis der nich puerpalen Osteomalacie, mit besonderer Beruckrichtigung der sogenannten Osteomalacischen Lahmungen. *Zeitschrift für das gesammte Neurologie und Psychiatrie,* 1914, Orig. xxvi, 397-437.

The author has found more cases of non-puerperal osteomalacia in patients with psychoses than in normal individuals. The condition is very rare, and is difficult to differentiate from other conditions causing softening of the bone. Indeed, it is doubtful whether the various forms of osteomalacia represent one specific disease.

It is difficult to distinguish clinically between the puerperal and the nonpuerperal forms. To be sure, some authors have found in the non-puerperal form that the thorax and vertebræ are especially affected, and that the pelvis shows fewer changes. But it is not well to place too much weight upon this factor in the differential diagnosis. The author has seen several cases of pelvic involvement, at times, in individuals with marked involvement of the thorax and vertebræ. The puerperal form has been said to be subject more to exacerbations and remissions, than the non-puerperal type, but this is not sufficient for a clinical differentiation.

The case is described of an elderly, unmarried woman with increasing deformity of the thorax, spine and pelvis, psychic disturbances, and pain in the shoulders, back and limbs. Treatment with phosphorated cod-liver oil was entirely unsuccessful. The muscle reflexes were exaggerated, the Wassermann test, positive. The diagnosis of osteomalacia was proved at autopsy to be incorrect. No osteomalacic changes were found. The ribs and sternum could be easily broken and were deformed, the pelvis was narrowed, the symphysis, curved forward. The author suggests that lues may have been a predisposing factor in producing the pseudo-osteomalacia, as it often is in *ostitis deformans,* but admits it is an hypothesis.

The first indications of osteomalacia are usually pains in the thighs, back, neck, and legs, especially in the knees. These pains are most acute at night and are aggravated by pressure. Disturbances of mobility follow the pains, especially difficulty in walking and climbing stairs. The difficulty increases, and gives rise to the characteristic "duck gait", sometimes presenting the appearance of paralysis. This paralysis may be present before changes in the form of the pelvis can be demonstrated.

The author describes the case of a young unmarried woman with increasing disturbances of mobility, which suggested osteomalacia, but which were found to be due to *dementia præcox*. The symptoms upon which the incorrect diagnosis was based were briefly as follows:

(1) Marked waddling gait.
(2) Weakness in pelvic, thigh and gluteal muscles.
(3) Contraction of the adductors and *genua valga*.
(4) Increasing gain in weight, especially about the hips where a square outline of the hips and thighs form a slight lordosis of the thighs which suggest a sinking of the trunk.
(5) Exaggeration of the patellar and the arm reflexes.
(6) Tremors, especially of the arms and legs, and spastic contractions all over the body.
(7) Pain in the shoulders, hips and legs, spontaneous or on pressure; this is most marked at night.
(8) Mechanical muscular sensitivity, tachycardia, psychic instability, nervousness, exaggerated vasomotor reactions, disturbances of secretion, profuse perspiration and, at first, rise in temperature.
(9) Practical cure of the pain and functional disturbances following a course of phosphorated cod-liver oil; this has been considered a specific in osteomalacia. Many authors consider it more effective than castration. The author gave one teaspoonful of 0.01 per cent phosphorated cod-liver oil from three to eight times a day; later he gave one teaspoonful of 0.03 per cent phosphated cod-liver oil from three to four times a day.

In the case described only the psychoses, and the growth of hair on the chin, lower lip, navel, inner surface of the thighs, breasts and base of the first phalanges of the fingers indicated *dementia præcox*.

The author considers that the glands of inner secretion play a rôle in osteomalacia, although he is not convinced that the condition is due to the hypo- or hyper-function of one specific organ, such as the ovary, thyroid, suprarenals, epithelium or hypophysis. However, the success of castration in the treatment of osteomalacia would indicate some connection between this condition and ovarian function.

The author considers that there are various direct causes of osteomalacia, and that the "exogenous factors (toxins, microbes) must be given a place among the pathogenetic theories." To explain the fact that the disease so often befalls gravidæ and puerperæ, and frequently follows thyroid disturbances, he suggests that the metabolism of the bones is directly or indirectly affected by various glands of inner secretion, and individuals with disturbances and changes in function of these organs possess an osseous system which offers diminished resistance to the still unexplained *osteomalacie noxae*."

The abnormal hairiness of the patient, the tendency to obesity, and the tachycardia, tremor, perspiration, etc., indicate glandular hyperactivity in the case described, but shed no light upon the particular gland involved, demonstrating rather a general, exaggerated over-stimulation of the vegetative nervous system. There is probably a connection between this over-sensitivity of the nerve-cells, and the disturbance in calcium metabolism in osteomalacia.

It is clear that in the case described there was a disturbance of the endocrine function.

Another case is described of an old woman (unmarried) with the typical deformation of the pelvis, and typical pelvic measurements, deformity of the thorax and spine, increasing difficulty in walking, pain, and paranoic psychoses, which began with the climacteric, and obesity indicating endocrine disturbance. The condition may be classified as *osteomalacia tarda*. The thyroid, hypophysis, ovary and pancreas seemed to be affected. The influence of the climacteric on the glandular activity and hence on the osteomalacia is clear in this case.

The osteomalacic paralysis has been considered by some to be a real paralysis, by others as only apparent, the disturbance of mobility being due to the weakness and pain in the muscles, and to the over-sensitivity of the nerves, or to the pain connected with the strain on the affected bone in walking or other movements. The author believes that many of the typical contractures in the early stage of the disease are due to the pain connected with intention tension, and with the general sensitivity of the nervous system, due to decalcification.

He does not consider that a deficiency in epithelial cells or a disturbance of their function can be assumed as playing a pathogenetic rôle in osteomalacia.

In conclusion the author believes that "although the form of the osteomalacic disturbances of mobility (paralysis) may be greatly influenced by the mechanical factors, the pain, and consequent intention contractions, the nature of these disturbances, with their accessory symptoms (spasm fatigue, muscular weakness, contractions, cramps, tremors, hyperesthesia, paresthesia, nervous susceptibility, disturbances of secretion, exaggerated vasomotor reactions, angiospastic manifestations, exaggerated reflexes, and mechanical muscular hypersensitivity) is due to a disturbance in the calcium metabolism *per se.*"

FIGUERAS BALLESTER, L.: Consideraciones sobre un Caso de Acondroplasia. *Revista de medicina y cirugia practicas*, Madrid, 1914, cv, 166-174.

The author defines achondroplasia as change in the endochondral ossification of the large bones, taking place during fetal life, with integrity of the periosteal ossification and of that of the cartilages which ossify after birth. Histologically the cartilaginous lesions consist in the formation of a fibrous band between the neutral cartilage and the zone of proliferation, in the irregular disposition of the cartilaginous cellules, which do not form parallel lines, and in the lack of formation of medullary spaces for the passage of the blood vessels in the cartilaginous tissue.

These lesions clearly differentiate achoncroplaxia from rachitis, in which condition the same changes in the periosteal ossification are combined with changes in endochondral ossification, consisting principally in functional disturbances of the osteoblasts, which are incapable of ossifying the trabeculæ formed by the cartilage, resulting in the formation of excessive medullary spaces. Rachitis is an osteogenic disturbance; achondroplasia, a cartilaginous dystrophia.

Similarly, one must differentiate anatomicopathologically between achondroplasia, dysplasia periostica, in which the periosteal ossification alone is disturbed, and the dyschondroplasia of Ollier, which is no more than a variety of rachitis.

In the case of the conditions capable of causing microsomia, the differences are much clearer, for one finds characteristic changes in certain organs and organic systems (the thyroids in myxedema and cretinism, the testicles in infantilism, the heart in mitral nanism, etc.).

Clinically considered, the achondroplastic individual is a deformed dwarf. The head is large, often huge, the cephalic index high. The well-developed trunk has normal proportions. The extremities are almost always short, due to lack of development of the segment nearest the root of the member. If to these characteristics we add an infantile intellect, and various accessory organic changes, such as squareness of the nails, a high arched palate, slight prominence of the nose, various slight curvatives of the members, equal length of all the fingers, or the junction of the superior members further back on the trunk than normally, we have an almost complete picture of achondroplasia.

The author describes a case of nanism in a sailor. His stature was sufficient to admit him to the army, but the abnormality could be easily observed by an experienced examiner.

The most notable point was the shortness

of the legs and arms in proportion to the trunk. When the arms were raised above the head it could be seen that the elbow was lower than the top of the head, whereas in normal individuals the two are on the same level. The total height was 1,540 mm. (5.05 ft.), of which the trunk comprised 495 mm. (1.62 ft.) the femur 335 mm. (1.0 ft.) and the leg below the knee (without the feet) 363 mm. (1.18 ft). In the normal individual the lower part part of the leg is equal to the femur in length (from the greater trochanter to the condyles). The patients upper arm and hand were shorter than normal, while his forearm was normal in length.

His cephalic index was 84.21, or decidedly brachycephalic, whereas the average index for other individuals of approximately the same stature was 78.40, or mesaticephalic. (Illustrative tables are given).

The height of the head in the patient represented more than one-seventh of the total stature, whereas in the normal individual the head measures only one-eighth of the total height. The patient may therefore be described as a macrocephalic micromelic, with a normal trunk. In addition to the diagnostic features of achondrophasia, one finds here the flattened appearance of the nose, the elevation of the palatal arch, the "saddle-back", and the shortness of the fingers, with typical squareness of the nails. Let this suffice for the somatic aspect.

As for the psychological symptoms, such patients are docile, kind, subnormal in intelligence, credulous as children, and obedient. Their mentality does not resemble that of cretins, and the conditions are not easily confused. This applies also to mongalism and myxedema.

The existence of micromyelia, the normal development of the hair on the genital organs, and the absence of syphilitic stigmata and of changes in the inner organs prevent confusion of the condition with hypogenitalism, hereditary syphilis, mitral hypoplasia, hypophyseal hypoplasia, etc.

The rachitic dyschondroplasia of Ollier produces digital deformities, and curvature of the members, but no disproportion in length between the members and the trunk. Furthermore, the macrocephalia differentiates achondroplasia from rachitic conditions, as do also the absence of changes in dentition, the absence of epiphyseal nodules and of deformity of the bones.

The history of the patient was negative. Of several children he was the only one who did not develop normally.

The author is unable to explain the condition as due to a change in the secretions of one or various glands, either of the patient himself, or of his mother. The etiology of the case is therefore left uncertain.

Czerny, A.: Die Ernahrungstherapie der Osteopsathyrosis. *Deutsche medizinische Wochenschrift,* March 6, 1919, xlv, No. 10, pp. 259-260.

In addition to the substances formerly considered to be the necessary components of a normal diet, i. e., albumin, carbohydrate, fat, salts and water, another group has recently been added—vitamins.

Funk suggested the name avitaminoses for disease due to deficiency of vitamins in the diet, and included rachitis in this group. The author is inclined to accept this theory of the etiology of rachitis, and calls attention to the unusual number of cases of the disease, especially of rachitic skull involvement, observed during the period when undiluted cow's milk was considered wholesome for infants and was generally given. The symptoms were relieved by a change of diet. Other authors consider boiled cow's milk an etiological factor in rickets, and therefore prescribe raw milk, with more or less success.

According to the author, rickets is due to over-feeding in general and to lack of variety in the diet where practically only milk is given. The author prescribes a proper proportion of fluid and solid food, variety, and the early addition of meat to the diet.

There is a special group of rachitic children who do not learn to stand or walk until they are from four to six years old, whose

physical and mental development is very backward, and whose bones, while they are not deformed or curved, show a tendency toward fractures. Peiser called this disease osteopsathyrosis. It is an open question whether the condition represents a malignant form of rickets or a combination of rickets with some other bone disease.

The ordinary treatment for rickets was ineffective in such cases, and the author therefore decided to treat them as a typical form of scurvy. In addition to the usual diet for rachitic children, he gave 100 grams of carrot juice daily, obtained by compressing finely ground raw carrots. The juice was easily digested, except that in a few cases it seemed to aggravate intestinal peristalsis. The results were favorable. In two or three months, the children learned to walk, although not normally.

According to Triese, keratomalacia as well as alimentary anemia also belong to the group of diseases due to a qualitatively deficient diet. The author would include osteopsathyrosis in the same category, and believes it probable that Funk's theory that rickets is an avitaminosis will be proven correct.

In a discussion of Czerny's article (*Deut. med. Wochenschrift,* April 3, 1919, xlv, No. 14, pp. 381-190), the question was brought up as to whether the backward development of the teeth in osteopsathyrosis is also favorably affected by dietary treatment.

Czerny replied that he saw no genetic connection between the bone development and dentition, the bones being of mesodermal and the teeth of ectodermal origin. Little outside influence can be exerted upon either dentition or hair growth, and although rickets impedes growth in general, he has not noticed whether dentition is any slower in osteopathyrosis than in any other form of the disease.

A case of acute digestive disturbance was quoted (Finkelstein) in which hair growth seemed to be directly connected with improvement and relapse.

Muller warned against the use of dried vegetables in rickets and osteopathyrosis. The vitamins are destroyed, or at least greatly diminished, in the process of drying, either due to the high temperature employed, or to the drenching of the vegetables before drying.

Bramwell, E.: Acute Poliomyelitis. *Edinburgh Medical Journal,* June, 1919, xxii, 345-56.

The author reviews the early theories as to the etiology of poliomyelitis. It was not until the closing years of the last century that the infective theory, formulated in Charcot's time, was supported by conclusive data. The first report of an epidemic form of the disease was given by Medin in 1890. Since then several epidemics have occurred, particularly in Scandinavia. Wickman directed attention to comparative frequency of abortive cases in which recovery takes place without paralytic manifestations; and to cases characterized by an onset with pronounced meningeal symptoms. He pointed out that the disease was closely associated with the highways of traffic, and that its method of spread was analogous to that established for other infectious diseases. He demonstrated that it may be transmitted by contact, food, inanimate objects, or by a third person.

The author believes that in the autumns of 1911 and 1912 cases of poliomyelitis were particularly frequent and that the percentage of adults who were attacked was unusually high.

All of the cases observed occurred during the latter half of the year, the greatest number occurring in August. In the Swedish and New York epidemics the maximum number of cases was met with in August and September respectively. In the author's cases the age at onset (in 18 cases) was as follows:

Under 5 years	5 cases
From 5 to 10 years	4 cases
From 10 to 15 years	3 cases
From 15 to 20 years	3 cases
Over 20 years	3 cases

These figures show an unusual proportion of incidences in adults and older children, as compared with earlier statistics. Dr. E. Bramwell found in 1908 that of the 75 cases which he had observed prior to that time, in only 5 was the age at onset over 15 years. The age at onset in different epidemics has varied greatly.

The author quotes a series of cases occurring in children of adjacent houses on an isolated farm and representing three separate types of involvement, i. e., the ordinary spinal type, the cerebral type, and the abortive type. The patients were all in good health, illustrating the fact that robust children are as likely to suffer as weaklings. In some instances a four-day interval occurred between the onset of the individual cases, suggesting the existence of an incubation period of four days or less.

It is probable that the mother of one family was the healthy carrier, conveying the infection from one child to another in both houses. Thus transmission by direct contagion is proved. School infection is suggested as a likely mode of transmission. Abortive cases are most apt to be sources of danger. Contagion is not always evident, and observations on monkeys have shown that a common fly (*Stomoxys calcitrans*), resembling the house fly, may transmit poliomyelitis.

Experiments in 1909 proved for the first time that the disease could be transmitted to monkeys by injecting an emulsion of the spinal cord of a fatal case into the peritoneum of the animal, thus demonstrating the presence of a specific causative organism. During the present year Flexner and Noguchi have succeeded in cultivating a microörganism in poliomyelitis, on a medium of human ascitic fluid.

The channels by which the causal organism enters the body have been variously thought to be the nasal mucous membrane, and the respiratory or alimentary tracks.

The chief difficulties in diagnosis arise in the preparalytic stage, but the condition may be mistaken for others at any time. During the febrile stage it is particularly apt to be confused with meningitis or articular rheumatism. Among the characteristic early symptoms of poliomyelitis may be mentioned: heavy perspiration, hyperesthesia, leukopenia, increased cell and globulin content of the cerebrospinal fluid.

The prognosis seems to have been more favorable in recent epidemics than formerly. It is certainly more promising in infants and young children than in older children and adults.

No specific therapy is yet available for the disease, but extensive work is being done on the subject. The efficacy of urotropin has been tested by Flexner, who found that it delays, if it does not actually inhibit, the experimental infection in animals. It should, therefore, be employed during the acute stage, when it may be given in doses of from 3 to 10 grains (0.195 to 0.65 grams) every four hours.

Prophylaxis is very important. To prevent infection the oral and nasal cavities of both patients and contacts should be cleansed with some antiseptic solution, such as 0.2 per cent solution of permanganate of potash. The patient should be isolated, as in any infective fever, and the stools should be disinfected. As the duration of the infective period is still unknown, it is best to isolate the patient for at least three weeks.

CARPENTIER: De la Circulation artérille dans les Membres atteints de Paralysie infantile. *Archives des maladies du cocur*, June, 1919, xii, No. 6, pp. 259-62.

A. Souques was the first to test the arterial pressure in infantile paralysis. With the sphygmomanometer of Pachon he compared the paralyzed and the normal members of 18 adult subjects, nearly all males, who had suffered for years from the condition.

In only 2 cases was the arterial pressure found to be normal, and in both cases the paralysis was slight and limited to a segment of the member. In the other 16 cases, the paralysis was marked throughout the af-

fected members, and atrophy and chilling were pronounced. Arterial pressure was greatly reduced. In 3 cases following lumbar poliomyelitis which had appeared when the patients were four years old, in which the atrophy of the legs was extreme and disability almost complete, the sphymomanometer failed to record a single oscillation. In the arms the oscillations were distinguishable, but greatly reduced in amplitude, so that it was difficult to distinguish between diastolic and systolic pressure.

In general, the circulatory disturbances seemed to depend less upon the age of the patient and the duration of the lesion than upon the degree of paralysis and atrophy.

It has been found (Souques and Heitz) that in cases of vasoconstriction there is geneenerally a diminution in the amplitude of the oscillations. The condition may progress until no oscillation at all is distinguishable. This is especially true for the lower limbs. But if the affected members are plunged into water heated to from 40° to 42° C. (104° to 107.6° F.) for ten minutes, the oscillations are again noted and reach the amplitude of the normal members. In cases of arterial obliteration the oscillations remain undiscernible or insignificant.

In cases tested, the arteries, in the members affected with grave infantile paralysis of long standing, were in an abnormal state, which was neither vasoconstriction nor obliteration, but which showed resemblance to both conditions. The oscillations reappeared in all cases, if the bath into which the affected members were plunged was hot enough and sufficiently prolonged; but the amplitude of the oscillations remained below that of the normal members. The systolic pressure also remained presistently below that of the normal members.

One is dealing here with a permanent, constant condition, while spasm and arterial obliteration by ligature are transitory conditions which may eventually terminate in recovery.

It would seem that in the members atro phied as a consequence of poliomyelitis in infancy, there has been a check in the development of the arterial membranes, although it is impossible to determine at what point the arrest took place.

Souques and Heitz found that in normal infants of less than four years, the arteries of the ankle greatly reduced oscillations. In the paralytic cases observed by these authors the poliomyelitis appeared when the infants were from one to one and a quarter years of age. One may therefore assume that the spinal lesion, which is responsible for the arrested development of the members, was equally to blame for the arrest in the development of the arteries. A diminution of the arterial caliber is easily distinguished by simple palpation, even after the hot bath.

Souques has formulated the hypothesis that the arterial atrophy might be an accessory cause of the muscle atrophy. He considered that long-continued heating of the affected member might be a palliative treatment for infantile paralysis. By reactivating the local circulation at regular intervals one might hope to somewhat relieve the trophic muscular and osseous disturbances. It would be necessary to bathe the members for at least two one-hour periods daily, in order to activate the circulation. The treatment should be continued for years, or at least until the end of the period of growth.

Williams and Babinski have corroborated the beneficial effect of repeated hot balneation during the subacute period of poliomyelitis.

Achard and Binet have observed analogous vascular states in conditions other than poliomyelitis. In one case of progressive myopathy, with pronounced atrophy of the left leg, the condition was diagnosed as atrophy of the arterial system analogous to that found in grave forms of infantile paralysis.

Bouilloc, F.: Clinical Considerations on Relapse of Typhoid Fever. *International Clinics,* 1919, Series 29, ii, pp. 267-79.

Relapse is relatively frequent in typhoid fever, occurring, on an average, in 4½ per cent of cases. In regard to the nature and

pathogenesis of typhoid relapse the author refers to three theories. The first is Lorain's theory of reinfection, i. e., that during convalescence from typhoid a patient may again develop the disease as a result of a new infection. This does not correspond with the known data relative to immunity acquired by the first attack of typhoid. Also, the average incubation period of the disease is from twelve to fourteen days. The interval between the original disease and the relapse is usually less than ten days, or shorter than the first incubation period. Logically, the second incubation period should be longer, as the organism changed by the primary infection, offers greater resistance to the specific bacillus which has recently attacked it.

According to Jaccoud's theory, (1) there is only one infection, and (2) both attacks are identical. This does not explain cases of multiple relapse, which occur frequently.

The author therefore advances the theory of *autointoxication*. "The bacillus of typhoid enters the organism by the digestive tract, and the most common lesion is found in Peyer's *patches*. . . . The bacilli multiply in the intestine, but do not remain localized there. They pass gradually through the mucosa and invade the blood-vessels and lymphatics, which transport them to the viscera. They soon disappear from the general circulation and become localized in various parts of the body."

The liver and biliary tract are most apt to be invaded, by way of the hepatic gland. The infection may remain latent for some time and only reveal itself a long time after recovery from the typhoid symptoms. It may manifest itself in the form of biliary calculi. "Infection of the liver may be demonstrated by puncture, done during the height of the disease; the hepatic juice withdrawn will be found rich in specific bacilli." Infection may also manifest itself by icterus.

From the beginning of the infection the spleen is hypertrophied. The bacillus is found in this organ at an early period of the disease; before the tenth day a drop of blood taken from the spleen will usually give rise to cultures of the bacillus.

The lymphoid organs and the bone-marrow are often involved.

Frequently no causative factor can be found to account for the occurrence of relapses. However, errors in diet, cold, or fatigue, diminish the bodily resistance and consume the energy needed to combat the bacillus. The febrile cycle recommences. A particular predisposition to relapse must be admitted.

The author considers that his theory escapes the objections raised against the other theories. He accounts for the shorter incubation period as follows: "During the primary period of incubation the germs. must multiply in order to attack the organism, and live in a latent state until they are strong and numerous enough to invade the organism. This requires a variable duration, according to the resistance of the subject.

"In relapse the microbe is already in the host in large numbers. The host is anemic and the tissues still feel the effect of the primary intoxication, while many cells have been destroyed and have not had time to be replaced. The organism is better armed against a new infection, but is debilitated in other ways.'

The same process may recommence several times. The immunity is not absolute. "The body does not become immediately and totally refractory to the specific bacillus causing the disease. Immunity is slowly acquired and then new properties acquired by the organism are insufficient by themselves to triumph over the bacillus, if the organism is debilitated. . . . This explains the infrequency of relapse, which is more apt to occur in epidemics, when the bacillus is endowed with a particular virulence. Perhaps, also, the patients in whom a relapse takes place are endowed with a special receptivity to the bacillus."

BURGER, H., *et* FOCQUET, R.: L'Encephalite lethargique. *Archives médicales belges,* Bruxelles, Jan., 1919, lxxii, No. 1, pp. 19-25.

The authors define encephalitis lethargica as an epidemic, toxi-infection syndrome characterized:

(1) Clinically, by a somnolent or lethargic state, paralysis or paresis of the nerves of the mesencephalon and, principally, of the motor nerves of the eye, and by an infectious febrile state.

(2) Anatomically, by an encephalitic process, more or less diffuse, predominating on the surface of the gray substance of the mesencephalon.

Netter attributes the condition to a specific pathogenic agent, not yet determined, which exhibits a preference for a limited region of the mesencephalon.

Lhermitte and Saint-Martin propose the name "primitive poliomeso-cephalitis with narcolepsy." They admit that the causative infectious virus may act upon other localities than the mesencephalon, but claim that the symptoms of encephalitis lethargica originate in the mesencephalon alone. It is doubtful whether the condition may be considered as a new morbid entity. It seems rather to be the expression of a specific localization of some polio-encephalitic process already known.

In other words, the causal agent is unknown, the clinical picture confused, and the anatomic-pathologic basis insufficiently determined.

The condition was first described under the name of encephalitis lethargica by von Economo in 1917, but in 1712 Camerarius reported what seems to have been the same disease.

The disorder is extremely grave, usually acute, and fatal in about one third of the cases. It has been associated with influenza, botulism, acute poliomyelitis, and with polioencephalitis. Von Economo considered it to be a clinical entity characterized by the association of stupor and paralysis of the ocular muscles, and caused by a specific organism which is analogous to, but not identical with, that of poliomyelitis, and which seems to have a marked affinity for the tissue of the central nervous system.

Von Wiesner attributed the disease to a Gram-positive coccus which grows on an anaerobic medium. He produced the characteristic phenomena of the disease in macacus rhesus by injecting an emulsion of the pathological cerebral substance into the dura mater of the animals.

Macroscopically a certain degree of softening of the tissue was found, with congestion of the meninges, without adherences and without true inflammation.

Microscopically infiltration of small cellules was revealed around the vessels of the grey matter at the level of the third ventricle, the aqueduct of Sylvius, the floor of the fourth ventricle, and the nuclei at the origin of the nerve O. M. commun. The lesions were perivascular. The nerve cellules showed acute degenerescence. There were lesions and extravasations at numerous points in the bulb and cortex.

The infection, probably propogated by way of the circulatory system, as testified by the disposition of the lesions around the vessels, may give rise to thromboses or emboli, showing a somewhat incoherent evolution.

From the semeiologic point of view one may note the somnolence and ocular phenomena arising from a partial lesion of the oculomotor nuclei. The frequency with which this syndrome recurred led Sainton to the conclusion that there was a center of sleep in connection with the motor nerves of the eye. The phenomena of clonic excitation and hemiplegia may persist, indicating an extension of the process to the grey cortex of the hemispheres. The clinical symptoms of meningitis are absent. The cephalorachidian liquid does not usually form more than a small proportion of the elements present. The cultures are sterile.

The malady is generally febrile.

The evolution of the disease may show diverse developments. One may find convulsions, aphasias, contractures, hemiplegias,

ataxic manifestations, catatonia, and mental phenomena.

The differential diagnosis may be difficult. The somnolence, the mesencephalous localization, the characteristics of the cephalorachidian liquid, the Wassermann reaction, may all serve to differentiate the disease from typhus, meningitis, tuberculosis, and the cerebral phenomena of grip, and (with more difficulty) from syphilis.

A case history is given, showing increasing somnolence, pain in the left temporal region, ptosis of the right upper eye-lid, with divergent strabism, slight facial paresis on the right side, exaggeration of reflexes, normal reactions to light and convergence, but faulty accommodation, resulting in confused vision. Diplopia was noted, and bilateral clonus of the feet. Dermographisms were marked. There was a progressive rise in temperature. The lips trembled and there was deviation of the tongue. The patient always lay on the right side, with the eyes turned to the right. On the day before death he had a nervous crisis and extreme pain in the head and right arm, continued trembling of the muscles of the neck and members, and contraction of the thumbs, and limbs, followed by coma. Pulse and respiration were accelerated and irregular; perspiration was excessive. The patient was greatly emaciated. The fluid yielded by lumbar puncture came in a jet, and was clear at first. but later, in the tube, became yellowish red. Sphygmographic tracings indicated jacksonian epilepsy. Death followed a marked hyperpyrexia. An analysis of the cephalorachidian fluid revealed a hemorrhagic process, probably underlying the clinical features. No bacteriological examinations were possible.

BACTERIOLOGY AND PATHOLOGY

Sippel, P.: Uber einen Fall von Ostitis fibrosa deformans mit ausgedehnten Knochen tumoren. *Archiv fur Gynaekologie,* 1914, ciii, 107-114.

The author describes the case of a 39-year-old woman of healthy family, whose history was negative until she was twenty-six, when a painless, hard swelling, about the size of a cherry, appeared on the outside of the lower right jaw. Several teeth were drawn and the cavities curetted, but the swelling continued to increase. Resection of the jaw, from the canines to the third molar, resulted in recovery. However, rheumatic pains appeared in the right hip, and a hard swelling formed on the posterior periphery. After her marriage and pregnancy the rheumatic pains became more acute, and late in the pregnancy the tumor on the right ilium increased in size, sharp pains were felt in both legs, and the patient was confined to her bed. The pains spread to the entire pelvis. The right femur increased greatly in size and was extremely painful. Four weeks before confinement the right humerus broke, following a slight trauma, and later the right femur, broke spontaneously below the swelling. With the aid of a forceps a healthy child was born, who showed no developmental or functional disturbances. The author found the child, at ten years, to be quite normal. The mother continued to suffer from pain in the hips, and became visibly smaller. The spine and chest were curved; the sternum was sharply bowed forward. The left femur increased in size, and broke twice spontaneously; the right femur and the right humerus also broke. Large painful bone tumors developed on the femora. For ten years before observation by the author, the patient had been confined to her bed, al-

though for the last five years there had been no further development of the pathological process, and no pain. A second pregnancy was interrupted, and the author proposes castration by roentgen-rays.

Photographs and *x*-ray plates show marked deformity. The right side of the mouth is drawn to the right by the resection. The clavicles protrude, and show curvature; so does the sternum. There is marked scoliosis of the spine. The pelvis is displaced to the right, the symphysis juts forward like a beak, the os sacrum is bent backward. The left femur shows a coxavara deformity and there are large swellings, which indicate the position of the bone-tumors. The movements of the shoulder and arm joints are free, the right hip and knee are completely rigid. The right leg is held in rigid extension. The left hip and knee joints allow flexion of only 20 or 30 degrees. The ankles and toes can be freely moved. There are no disturbances of the inner organs. The urine shows no pathological content; the blood is normal. There is marked exophthalmos of both eyes, but no disturbance of function.

On examination of the interior genital organs the soft, gravid uterus is found to be in movable anteflexion, somewhat displaced to the right. The adnexa are normal. The lowest lumbar vertebra is depressed and has been forced into the pelvic aperture, which is extremely narrow (7 cm.).

The *x*-ray reveals the marked porus condition of the bones, and the consolidated well-healed fractures in the right humerus. The large tumor on the right ilium has a thin bony shell, and is filled with coarse tissue. There are cavities about the size of a cherry, which resemble multilocular cystoids. The bone appears to be puffed up, as if blistered, with compressions at the loci of the old fractures defining the large tumor. The collum of the left femur is sharply curved to the right and shows marked osteoporosis. The tumor below the trochanter is the size of a child's head, and plainly shows its cystic structure. There are numerous bone-cysts divided by five bone lamellæ. The hard tumors are round toward the front and sides, and flat in the back, proving that they were probably very soft during their development and were flattened by the pressure of the patient's body during her long confinement to her bed. The bones and tumors are not sensitive to pressure.

The author diagnoses the condition as "tumor-forming ostitis fibrosa deformans", or metaplastic malacia of the Recklinghausen type, rendered acute by pregnancy.

He assumes that "besides the decalcification and softening of the bony tissue, fine, fibrous, osteoplastic connective tissue was found, traversed by young bone trabeculæ, and reticular, osteoid bony tissue. There was a constant degeneration and regeneration of bony tissue. The secondary softening and rarefication of the newly-formed fibrous tissue led to cyst formation, which gradually, in the course of years, resulted in the development of huge tumors."

Barrie, G.: Fibrocystic and Cystic Lesions in Bone. *Annals of Surgery,* 1918, lxvii, 354-363.

There is a great diversity of opinion as to the etiology of fibrocystic and cystic lesions. The most common source of error seems to be the tendency to mistake a generalized or systemic pathologic process for a purely localized condition, or to diagnose a lesion as "bone cyst" on the strength of the roentgenogram alone.

The author classifies non-neoplastic lesions into two groups: "Group 1 includes all multiple fibrocystic and cystic lesions, i. e., multiple lesions in a single bone, single lesions in numerous bones, and multiple lesions in several bones. All disease process covered by this group may be considered as due to some general systemic disturbance; Group 2 includes all solitary fibrocystic lesions which conform to the modern conception of a non-neoplastic state". These constitute the greatest number of the bone affections which are fibrocystic in character. Most of them are amenable to surgical intervention and cure.

The etiological factors causing multiple lesions in Group 1 are (*a*) metabolic processes, (*b*) syphilis, (*c*) tuberculosis, (*d*) other bacterial infections, (*e*) parasites, and (*f*) hemophilia.

The solitary lesions of Group 1 seem to be caused by localized trauma in 75 per cent of cases, the remainder being due to the same factors as the multiple lesions.

Group 1.—(*a*) *Metabolic Processes.*—Faulty bone metabolism is believed to be due to interference with endocrinal glandular equilibrium. Recent investigations seem to show that the parathyroids play a rôle in calcium content control. McCrudden found that feeding with foods lacking in calcium salts never decreased the calcium output, and that after a period of such feeding, bone softening occurred. This process of softening may be regarded as a step toward the later formation of general multiple fibrocystic and cystic lesions in bone.

The author quotes von Recklinghausen's classification of these bone changes as "malacia", including myeloplastic, phlegmatoplastic, and metaplastic, the latter embracing "osteitis deformans, or Paget's disease". The fibrocystic stage of the lesion is always deficient in lime salt. The hyperplastic solid phase (osteitis deformans) exhibits areas of lime salt content in greater than normal amounts and an increase in osteoid tissue. The author considers that both osteitis fibrosa and osteitis deformans are due to excessive hyperplasia of soft fibrous structure, whose origin is in the reticulum of the bone-marrow. During the formation of this soft tissue a partial or complete obliteration of many of the smaller vessels takes place, "Causing inhibition of bone nutrition, with resultant halisteresis or absorption." This tissue, at the stage of cystic formation seems to have no affinity for lime salts. On the other hand, the solid lesions (Paget's disease of the bone) exhibit not only dense fibrillation, but also increased lime salt content. This may be a reconstructive effort, as evidenced by the presence of granulation tissue and giant-cells in the lesions. "It has never been demonstrated that the giant-cells, accompanying granulation tissue, had any other function than that of a scavenger, or that they have anything to do with neoplastic growth". The microscopic picture of fibrosis found in those lesions simulates the fibrosis of a chronic cystic mastitis.

(*b*) *Syphilis.*—The inherited or congenital form of syphilis sometimes "exhibits localized areas of disease in the cancelli, particularly of the bony bones which are fibrocystic or cystic in character." These lesions may be found in one or in several bones, and are primarily due to infiltration of gummatous foci, which has produced bone destruction. The products of the gumma are absorbed, and the fibrocystic or cystic lesion is left as an end-result. The affected bones may not present any of the pictures suggestive of syphilis, such as a general thickening of the cortex, periosteal inflammation, bowing or irregularity of the peripheral lines. Where only a solitary lesion exists in the cancelli, the etiology is often uncertain.

(*c*) *Tuberculosis.*—This condition is rarely a causative factor.

(*d*) *Other Bacterial Infections.*—The chronic phases of these conditions sometimes present localized areas of ostealysis near joints which are found at operation to be fibrocystic or purely cystic in character.

(*e*) *Parasitic Cysts.*—The author observed only one case among thousands of bone lesions. The infecting parasite was an echinococcus, formed in the upper end of the femur.

(*f*) *Hemophilia.*—A lesion, showing under the *x*-ray a localized area of osteolysis in the upper end of the tibia, has been observed in a greatly enlarged hemophilic knee.

Group 2.—This group includes the solitary fibrocystic and cystic lesions in bone that arise independently of degenerative cystic changes in benign or malignant neoplasms. These lesions are never primary, always chronic, and usually inactive. The apparent etiologic factor, in about 75 per cent of cases, is bone trauma, due to direct injury, dating back months or years. In all cases the injury is followed by a primary effort at repair, by the formation of granu-

lation tissue, and later by fibrocystic changes, showing failure of the effort at complete restoration. The same efforts at restoration take place in localized lesions due to hematogenous bacterial infections, by syphilis, and by tuberculosis.

These solitary frankly cystic lesions are usually entirely free from detritus, granulations, or fibrous tissue, containing, at times, clear straw or sanguineous fluid. The cavity is cemented by a wall of osteofibrosis or by a dense, bony shell ranging from 1 to 5 mm. in thickness. When a lining membrane intervenes, the bony or osteofibrous wall is usually absent.

The cysts found in so-called medullary giant-cell sarcoma (hemorrhagic osteomyelitis) should be grouped with the fibrocystic inflammatory lesions of bone. The condition is described by Berard and Alamartine as "A diffuse fibrous or fibrocystic process, composed of tissue poorly nourished and soft. Increased softening gives rise to multiple cysts." On the other hand, in the localized lesion due to trauma, the fibrous structure is quite firm, dense, and avascular. The lesion is a terminal stage of a primary process which originated in a localized hemorrhagic osteomyelitis, which was preceded by direct mechanical injury or by an infection. In these cases further bone or tissue destruction does not occur.

Clinical Picture.—The lesions are more frequently observed in the first two decades of life. A history of trauma is usually elicited. Pain is never constant, and often absent. A localized enlargement or limitation of movement may be noticed, and is usually the symptom which leads the patient to consult a physician.

Diagnosis.—Roentgen diagnosis is the most valuable preöperative method, and even the *x*-ray cannot reveal accurately the type of the lesion, or the presence of soft tissue, pus, fluid, lining membrane, etc. However, roentgenograms taken at stated intervals may give a good picture of the pathological process. One may differentiate localized hemorrhagic osteomyelitis from solitary fibrocystic lesions due to metaplastic osteomalacia by the fact that "the former gives a more clearly defined *x*-ray picture, greater regularity of outline, and is more nearly circular or oval in shape, dependent upon its location in cancellous structure." The fibrocystic and cystic lesions whose origin is not metaplastic or due to parasites, do not increase in size. Chronic sterile bone abscesses without sequestra, also remain stationary; therefore a differential diagnosis with the *x*-ray is difficult or impossible. All of these lesions are operable.

Treatment.—In diagnosing multiple fibrocystic lesions the clinical and *x*-ray findings must be correlated. The treatment of solitary lesions is surgical. Very careful operative technic is essential. Following thorough curetting the cavity should be swabbed with tincture of iodin, especially for its irritant stimulating regenerative effect. The author advises against the use of carbolic acid, zinc, or other destructive chemicals followed by the use of alcohol, now commonly used for swabbing cavities. The iodin has no destructive qualities but is used for stimulating the formation of healthy granulations. The process of repair and cure is hastened by filling the cavity with bone shavings taken from the bone above and below the lesion. "Whether or not osteogenesis takes place in the shavings, they act as a scaffold in supporting the blood-clot filling the cavity; the clot in turn acts as a prop in supporting the out-cropping granulation tissue buds and fibrils" which later become bone.

The disadvantages of the "plombierung" method of Moosètig-Moorhaf as compared to the simple filling method follow: (1) The cavity must be dry; (2) the preparation must be in exact proportion to the ingredients; (3) it must be poured into the cavity at a certain temperature difficult to maintain, or else it shrinks and does not touch the bone at the periphery; this is essential to success; (4) the iodoform content of the plug is sometimes intoxicant to the patient.

Beck's bismuth paste, and Mikulicz "agar-agar" jelly do not always absorb properly.

Very large lesions exhibiting excessive

vascularity, following thorough curetting, may be tightly packed for a few days before closing. Otherwise all wounds should be immediately closed without drainage.

Illustrative case histories are given.

Sartory, A.: Bacille Tuberculeux et Oospora Acido-résistant. *Bulletin de l'Académie de médecine,* March 11, 1919, lxxxi, No. 10, pp. 281-3.

During a series of experiments, the author was surprised to find in samples of urine and sputum from a patient suspected of pulmonary tuberculosis, certain microörganisms, which were at first considered to be tubercle bacilli. At the first examination they could not be distinguished from Koch's bacilli, as both were acid-fast and showed the characteristic internal granulation. They were finally identified as acid-fast mycelian oospora.

One distinguishing factor between these organisms and tubercle bacilli is the fact that in the case of the latter the acid-resistance survives several transplantings, while in the case of the oospora it disappears after 3 transplantings.

Inoculation of the oospora into guinea-pigs and rabbits gave negative results.

The author has found that the organism also occurs independently of *Bacillus tuberculosis.*

The oospora breaks very easily, and its elements always take a bacillary form on a medium of salep maltose. At this period of development it is almost impossible to distinguish the organism from *Bacillus tuberculosis.*

Kligler, J.: Non-lactose-fermenting Bacteria from Polluted Wells and Subsoils. *Journal of Bacteriology,* iv, No. 1, pp. 35-42.

Kligler found that the type of organism predominant in polluted well water belonged to the gas-producing para-enteritidis group most common in the intestinal tract of swine, cattle and other domestic animals, while the polluting organism in subsoils was a non-gasforming bacillus found by Morgan, Lewis and others in the stools of normal individuals and of those suffering from diarrhea.

Sugiura, K., and Benedict, S. R.: The Action of Radium Emanation on the Vitamins of Yeast. *Journal of Biological Chemistry,* 1919, xxxix, p. 421.

The authors review previous studies. They show that growth-promoting factors in yeast may be partially inactivated by means of exposure to radium emanation, suggesting that the therapeutic effect of radium upon neoplasms may be due to the destruction of the growth-promoting substance. Incidentally they find that 2 per cent yeast content in purified artificial diet seems to be sufficient to promote normal growth in young albino rats.

Greenfield, J. G., and Anderson, J.: Note on a Method for the Sedimentation of Tubercle Bacilli in Sputum. *Lancet,* London, Sept. 6, 1919, ii, No. 10, p. 423.

The authors describe a method of examining suspected sputum, which they have used with great success and satisfaction:

5 c.c. of sputum are mixed with twice their volume of:

Sodium carbonate	(cryst.)	1
Acid carbolic	(cryst.)	1
Water		100

in a centrifuge tube. This is covered with a rubber cap and shaken for a few minutes. It is then incubated for from twelve to twenty-four hours. At the end of this period the tube is centrifugalized for about fifteen minutes. The supernatant fluid is poured off, and films, made from 2 to 4 loopfuls of the deposit, are stained in the usual way.

This method has several advantages over others:

(1) It takes less time than the direct smear

method, especially when there is a large number of sputa to be examined. The rapidity with which the frankly positive sputa can be picked out compensates for the slightly longer technic.

(2) The sputum is generally sterile after incubation. The authors have tested many sputa, with uniformly negative results, both as regards tubercle bacilli and pyogenetic organisms. For routine work this is a great advantage.

(3) The films resemble direct smears both in the relative proportion of the organisms present, and in the presence of mononuclear and polymorphonuclear cells, but the mucus is not stained.

A table showing the number of bacilli counted in fifteen fields shows that many more bacilli were found by above technic than by the Ellermann and Erlandsen method.

The advantages of the simplified method, therefore, as regards accuracy, cleanliness and time, are obvious, according to these authors.

RAW, N.: Attenuation of Human, Bovine and Avian Tubercle Bacilli. *Lancet,* London, March 8, 1919, i, pp. 376-7.

The author gives the results of twelve years' work in subculturing pure cultures of human, bovine and avian tubercle bacilli on artificial media containing glycerin.

At the end of this period the cultivations are found to be still luxuriant and to grow as readily as in the first year of subculturing. They retain their characteristic and selective appearances, and the distinct types can be readily identified.

Inoculations into rabbits and guinea pigs, made at various times during the twelve years, show that there has been a gradual decrease in virulence, until at present the bacilli are almost non-pathogenic to animals.

The original culture of human bacilli, given to the author in 1906 by Dr. Koch, was prepared from sputum taken from a patient in the last stages of pulmonary tuberculosis. The original bovine culture was prepared by Prof. Calmette from the mesenteric glands of a cow with advanced tuberculosis of the udder. The avian culture, from Prof. Bang of Copenhagen, was from a chicken which died from epidemic tuberculosis in fowls.

Therapeutic use of these cultures is based upon the following facts: "(1) The human body is attacked by two distinct types of bacilli—human and bovine. (2) These two types cannot grow in the body at the same time. (3) Their method of infection is different and selective. (4) Human and bovine bacilli are antagonistic to each other, and a mild infection of one type . . . produces immunity to the other type."

The organisms are not transmutable, and cannot by any artificial growth be changed from one to the other type.

The object of the author's work was to find out whether it is possible to reduce the virulence of the bacilli to such a degree that they may be used therapeutically in the treatment of active tuberculosis.

In 1914 several animals were inoculated with the bacilli of nine years' attenuation, with practically negative results, as shown by physical findings and postmortem.

Eight cases of apparently hopeless tuberculosis of the glands, bones, joints, and lupus were treated with injections of living bacilli, administered subcutaneously in the triceps region. No bad effects were observed. Later 4 cases of acute and active pulmonary tuberculosis, with large numbers of bacilli in the sputum, were treated in the same way. One case, treated five years ago, is entirely cured, the other patients are still living, but the data is not yet complete as to their progress.

All of the cases were treated by mixed bacilli, the cultures being raised to a temperature of 220° F. (104.44° C.) for two minutes before injection.

The whole object in the treatment of tuberculosis is to prevent the growth of bacilli in the body. Although the cases treated by the author's method are too few for definite conclusions to be drawn, he feels that "care-

ful use of such attenuated bacilli may have the effect of controlling and probably preventing tuberculosis infections in the human body, in much the same way as vaccination protects against small- pox, and antityphoid vaccine against typhoid fever."

Quelme et Houal: Procédé Spécial d'Homogénéisation pour la Recherche du Bacille de Koch dans les Crachats. *Le Bulletin médical,* Paris, May 24, 1919, xxxiii, No. 23, p. 271.

The author suggests a simple and effective method of demonstrating tubercle bacilli in the sputum, by homogenization.

(1) Mix from 5 to 10 c.c. of cold sputum with 20 c.c. of anti-formin in 40 per cent solution, in a graduated glass; triturate gently for a few minutes with a glass ring. Let stand for a short time, then triturate again until the mixture is completely homogeneous. Let stand for half an hour, shaking at intervals.

(2) Add 20 c.c. of alcohol at 60°, shake the mixture for a few seconds, and test the density. If it exceeds 1,004, add alcohol until it is reduced to 999 or 1,000.

(3) Pour the mixture into a decantation flask with an emery cork and a glass stop-cock at the bottom. Filter through sterilized cotton to remove débris of food, tobacco, etc. Add 22 c.c. of ether, and cork securely, in order that the liquids may become homogeneous. Invert the container several times, opening the stop-cock occasionally, to let any gas escape.

(4) After several inversions place the container in its normal position and let stand for some minutes.

(5) The liquid gradually separates into two strata, the lower part being quite clear, and a cloudy area marking the point of separation from the ether. Decant the lower liquid, to the level of the stratum containing the bacilli, after uncorking the container and opening the stop-cock.

(6) It is sometimes necessary to recork the container and roll it between the hands, to precipitate flocculent particles which the ether retains in suspension. In such a case let the mixture stand again until a gray precipitate is formed.

Martin, B.: Ein Fall von generalisierter Osteitis fibrosa. *Deutsche Medizinische Wochenschrift,* April 10, 1919, lvi, No. 15, p. 423.

In general osteitis fibrosa there is a fibrous degeneration of the marrow; the bone-tissue is transformed to a spongy substance. The soft, decalcified bones, when forced to bear heavy burdens—as, for instance, the femur and vertebræ—become deformed. Under the *x*-ray the characteristic changes are: (1) the pronounced swelling of the bones; (2) the hazy border-line between bone and the surrounding soft tissues; and (3) the disappearance of the marrow-canal.

In the case presented for observation, it was noticeable that this soft, decalcified bone, after fracture and osteotomies, showed a remarkably firm and profuse callus formation. A course of treatment with phosphorated cod-liver oil brought about marked improvement; this could be followed roentgenologically.

Basten, J.: Vacunacious forzosa la poblacion civil contra el tifus. De la aparicion del tifus tras la vacunacion. *Deutsche medizinische Wochenschrift,* March 18. 1920; abstr. *El Siglo médico,* May 1, 1920, lxvii, No. 3464, p. 332.

The author arrived at the following conclusions:

(1) The inoculation was harmless in the case of individuals of all ages.

(2) No ill-effects were noted in puerperium nor in co-existing chronic diseases, except in some advanced cases of pulmonary tuberculosis. In the latter cases, it was not

clear whether or not the unfavorable effects were due to vaccination.

(3) The English vaccine, prepared with paratyphoid bacilli A, and B, does not produce a more intense reaction than the German vaccine prepared with typhoid bacilli alone.

(4) The inoculations reveal several cases of typhoid which are in the incubation period, thus rendering it possible to isolate them and to protect the rest of the population from infectious individuals.

(5) The mortality rate of the population is reduced by the use of the vaccine.

(6) Inoculations exercise a favoroble effect upon serious cases of typhoid.

(7) During an epidemic, obligatory antityphoid vaccination would constitute an effective method of combating infection. The triple injection should be given, and all individuals between the ages of three and seventy years should be vaccinated.

Caldwell, G. T.: Chemical Changes in Tuberculous Tissues. *Journal of Infectious Diseases,* Feb., 1919, xxiv, 81-113.

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In the study of pathological calcification, both staining and chemical methods have been used for the recognition of fats in tuberculous tissues. "Specimens of human and bovine tuberculous lymph-glands, stained with Sudan III, revealed marked infiltration with fine and coarse fat granules, all through the areas that are acellular, the largest and most abundant granules being usually at the periphery. When counterstained with hematoxylin, calcium deposits were found to lie in such tissues as were stained for fat, but there was no particular difference to be noted in the amount or character of the fat in the vicinity of the calcium deposits and elsewhere. . . . Wells calls attention to the fact that bovine tuberculous lesions differ from human lesions in that calcification occurs during the progress of the disease and is extensive in the form of innumerable sand-like granules, scattered all through the tuberculous tissue, even while the disease is in the most active stages. Calcification is usually an evidence of latency or healing in human tuberculous areas and deposits are found in much larger masses, each of which usually correspond to an entire tubercle. Two sorts of bovine material were collected. . . . One consisted of the fluid, pus-like content of a large softened gland. This material escapes when the glands are opened and contains but few granules of calcium, large enough to be felt by the finger. The other specimen was obtained by scraping the surface of unsoftened tubercles and the walls of the tubercle cavities. It consisted largely of calcified material and the adherent tissues. The total lipin content of the scrapings from the walls of the calcified bovine lymph-glands was found to be very appreciably higher than that of the caseous, liquid content of these lymph-gland tubercles. Since these values are based on dry weight, this difference is dependent in no direct way on water content. Likewise the low lipin content of this dried caseous material cannot be attributed to the presence of heavy calcium salt, for both calcium and phosphorus are present in only about one-third of the amount found in the scrapings of the tubercle walls. The lipin content of calcified human tuberculous lymph-glands is low, but in this case the calcium and phosphorus value are extremely high, showing that the dry weight here is made up in large part of calcium salts."

Pages 111-113:

The water content in normal bovine lymph-glands constitutes about 81 or 82 per cent of the moist weight. No very distinct difference is noted between peribronchial and mesenteric glands. The tubercle walls and the caseous material from the lymph-gland tubercles contain a lower percentage of water than does the normal tissue.

In normal bovine liver tissues, the percentage of water is less than that of tubercle walls or the caseous material from the liver tubercles. The walls of the lymph-gland tubercles contain a larger amount of lipin than does the caseous material or normal tissue.

The lipins from the walls of lymph-glands and liver tubercles always contain two or three times as much cholesterol as do the lipins from normal tissues. The lecithin content of the fats from the bovine tubercle walls is slightly less than that of the normal tissues, while there is a marked reduction in the lecithin content of the lipins from the caseous material of purely bovine origin.

The amount of iodin in the fats of tuberculous lymph-glands is greater than in normal tissues.

The amount of purin nitrogen of lymph-gland tubercules is only slightly more than one-half of that of normal lymph-gland tissues and much less in the caseous material.

DIAGNOSIS

EDITORIAL: The Indications for Therapeutic Pneumothorax. *New York Medical Journal*, May 22, 1920, cxi, No. 31, p. 907.

"Surgical pneumothorax should not be performed in benign abortive tuberculosis, in slow saprophytic forms, or in the fibrous type. The diffuse types with bronchial distribution, accompanied by extensive inflammatory epiphenomena will rarely benefit by it. Artificial pneumothorax is indicated in the extensive localized ulcerative forms and in congestive caseous types, in young subjects, having a destructive evolution and frequently hemoptysis". Next are "the fibrocaseous forms, usually unilateral, where it is necessary to weigh the risks inherent to the interference with those of the spontaneous evolution of the process."

"Finally, come the acute types, the pneumonic and bronchopneumonic with a lobar distribution, in which the patient has nothing to lose by the operation and in which one frequently observes a surprising arrest in the progress of the lesions following artificial pneumothorax. Frequently these arrests are only momentary and as Renon has pointed out, the result is merely a delay in the progress of the disease. In the granular forms artificial pneumothorax will never be successful. In these cases the question of the degree of the tuberculosis should never be taken into consideration. The minute that the spontaneous evolution of the affection makes the patient run greater risks than those of the operation itself, the latter should out-weigh all else. The question of degree is of little importance because an early operation has many advantages which are especially evident from the fact that adhesions have not formed, that new localizations are thus prevented, and finally that the patient's resistance becomes greater.

"In order to operate with success, the lesions should be unilateral, not from the pathological viewpoint but from that of evolution. On the one hand, a single lung is hardly ever alone the seat of the disease, and on the other, a pneumothorax done for lesions in full evolution in one lung often acts favorably on the lesions pust beginning in the opposite lung. In hemoptyses and particularly severe pulmonary hemorrhage from ulcerating cavities which, in themselves or by the infectious complications they bring about, may result in death, artificial pneumothorax is the only sure means at our disposal for controlling this complication, as it stops the hemorrhage just as a ligature does. A spontaneous pneumothorax in a case of tuberculosis should be continued and, when it is only partial, it should be made complete. Tuberculous empyema is another indication for making an artificial pneumothorax. To sum up, it can be said that surgical pneumothorax is indicated in every case where there is a menace to life from extension of a local lesion and that it is frequently successful."

CONFERENCE ON TUBERCULOSIS OF THE LUNGS: What Other Diseases are Mistaken for Pulmonary Tuberculosis? *War Medicine,* Jan., 1919, ii, No. 6, pp. 985-8.

Capt. W. A. Somerville: "In the order named the following conditions have come to us with the diagnosis of tuberculosis:

1. Gastric duodenal conditions with loss of weight, cough, asthenia, and shortness of breath.
2. Hyperthyroidism.
3. Psychoneuroses.
4. Syphilis of the lung, and new growth.
5. Bronchitis, due to Klebs-Löffler bacillus.

The latter cases all cleared up under the use of antitoxin. We have found no case of streptothrix."

Lieut. Col. A. Castellani: The author emphasizes two affections often mistaken for pulmonary tuberculosis: *i. e.,* bronchospirochetosis, and bronchomycosis.

Bronchospirochetosis.—Prof. F a n t h a m has discovered the coccoid stage of the organism. Clinically three types of disease may be distinguished: the acute stage, the sub-acute stage, and the chronic stage. In *the acute stage* the patient feels chilly and develops fever, which lasts for from 3 to 6 days. There are rheumatoid pains all over the body, and frequent cough, scanty expectoration, mucous or mucopurulent. The type resembles influenza.

In the *subacute and chronic types,* which simulate pulmonary tuberculosis, the patient often spits up blood. There may be serotine fever, and wasting. In other cases the general condition remains good, in contrast to the presence of bronchopulmonary hemorrhages.

The diagnosis is based upon the presence in the sputum of numerous spirochetos of the bronchialis type, while tubercle bacilli are not found. As a precaution the patient should disinfect his mouth and throat before coughing up phlegm for examination. This is for the purpose of ridding the outer passages of spirochetes.

The prognosis, *quoad vitam,* is usually favorable, but recurrences are frequent and the condition may last for years, with apparently free interims.

The treatment includes a *change of air,* with *rest* and plenty of *good, nourishing* food. In some cases *arsenic* will be found useful, and at times a mixed, *arsenic-tartar emetic* treatment is beneficial.

Bronchomycosis.—This term covers etiologically different but clinically similar conditions, which may be classified as follows:

"1. Due to fungi of genus Nocardia.
2. Due to fungi of genus Momilia and genus Oidium.
3. Due to fungi of genus Hemispora.
4. Due to fungi of genus Aspergillus, genus Sterigmatocytosis, genus Penicillium, genus Mucor.
5. Due to fungi Sporotricum and genus Acladium.
6. Due to fungi which have not yet been definitely classified."

In *the mild clinical type* of the disease the patient has the usual symptoms of a mild attack of bronchitis, which is generally cured within a few weeks.

"*The severe type* may resemble tuberculosis. The general condition of the patient is poor; he is weak, has serotine fever, and may waste rapidly. There is cough with mucopurulent expectoration, which may be tinged with blood. The physical examination shows patches of dullness in certain cases, and crepitations. The course is variable, and the malady may end in death."

The diagnosis is based upon microscopical and cultural examinations of the sputum.

"The prognosis depends upon the species of fungi found and upon the general condition of the patient. If the condition is of nocardial origin the prognosis is bad, if of monilian or odium origin, it is less unfavorable, if of hemispora or sporotrichum origin, or due to fungi rapidly influenced by potassium iodid, the prognosis is good."

The treatment consists in administering large doses of *potassium iodid,* which, however, acts only upon certain fungi.

The author emphasizes the importance of further study of these two conditions, both from a scientific and practical point of view.

Johnston, J. T.: Pneumothorax. *American Journal of Medical Science,* July, 1919, clviii, No. 1, pp. 105-7.

Ninety per cent of all cases of pneumothorax are due to advanced pulmonary tuberculosis. Pathological lesions may be detected by the following technic, suggested by Hoover: .

"The diagnostician places his thumbs at the most prominent parts of the sides of the thoracic costal angle, usually where the ninth rib joins by its cartilage the sternum, with the rest of each hand enfolding the sides of the lower thorax on either side. Excursions of respiration, exaggerated by the patient, when possible, allow the movements of the thumbs to be studied, whether outwardly, equal, or actually drawn in toward the middle line. The findings from this observation show any interference of the diaphragmatic range, if present, and point to the side of thoracic pathology, whether from pain, fluid, consolidation or adhesion."

Draper, George: Clinical Study. A New Point of View in Approaching the Diagnosis and Treatment of a Patient. *Endocrinology,* April-June, 1919, iii, No. 2, p. 164.

A procedure is outlined for studying a patient with the greatest possible attention to details of history and physical examinations, embracing anatomical, physiological, psychological, and immunological inheritance, development, and functions. This study of the individual should dominate the investigation, rather than his affliction, since the pathological disturbance is so frequently an integral part of the whole fabric of his personality.

Brown, G.: Post-anaesthetic Acidosis. *Indian Medical Gazette,* Calcutta, March, 1920, lv, No. 3, p. 114.

The following rules for the avoidance of *post-anaesthetic acidosis* are given:

(1) Examine the urine in every case for acetone before operation.

(2) Try the breathing test. The patient sits perfectly quiet for five minutes, then draws a full, but not abnormally deep, inspiration. The breath is then held, with the mouth closed and the nostrils compressed with the fingers, while the time is noted. The normal period for which the breath can be held in this manner is 30 to 40 seconds. According to Stange, any period under 20 seconds contraindicates general anaesthesia.

(3) (*a*) Administer 8 c.c. of syrup of glucose every four hours, for twenty-four hours before operation, or (*b*) administer 1.6 gm. of pancreatin one hour before operating, and as soon as possible after operation.

(4) Some light food should be given four hours before the operation.

(5) Give morphine 0.01 gm., and hyoscine 0.0006 gm., one hour before operation.

(6) After the operation give glucose by the rectum and by the mouth.

(7) If there is much vomiting, examine a catheter specimen of urine at once.

(8) Avoid chloroform whenever possible.

(9) Use ether by the open method, and from a recently opened bottle only.

Vernes, A.: Indices syphilométriques. Determination colorimétrique des Etats de Stabilité. *Comptes rendus hebdomadaires des séances de l'Académie des sciences,* Sept. 30, 1918, clxvii, 500-503.

It is possible to distinguish a syphilitic from a normal serum by the way in which it diminishes the stability of a colloidal, specially cultured suspension, measurable by the degrees of hemolysis.

In order to register the degree of hemolysis, in testing for syphilitic serum by the

author's method, a colorimetric scale is necessary, in which the tube with most color will serve as a constant control of the quantity of red corpuscle to be introduced in each test. Vernes describes his scale as follows:

"The tints in my colorimetric scale run from 8 to 0, and liquid Number 8, the maximum color, is prepared as follows:

"Fuchsin, acid, at 1 to 1,000 in distilled water.....10 c.c.
Picric acid at 1 to 1,000 in distilled water.....10 c.c.
Acetic acid (crystallizable) 4 c.c.
Formol at 40 to 100 2.5 c.c.
Distilled water to make 100 c.c. } mixture 110 c.c.

"The other tints of the scale are obtained by diluting liquid Number 8 with acetic water, in the following proportions as indicated in the table below:

"Liquid 8 diluted to 1/2 (1+1) gives liquid 7
"Liquid 8 diluted to 1/3 (1+2) gives liquid 6
"Liquid 8 diluted to 2/9 (2+7) gives liquid 5
"Liquid 8 diluted to 4/27 (4+23) gives liquid 4
"Liquid 8 diluted to 8/81 (8+73) gives liquid 3
"Liquid 8 diluted to 16/243 (16+227) gives liquid 2
"Liquid 8 diluted to 32/729 (32+697) gives liquid 1
"Liquid 8 diluted to 1/65 (1+64) gives liquid 0

"This amounts to adding to a color half of its volume of water, in order to obtain the next color which falls next below in the color scale.

COMPARISON OF THE COLOR CONTENTS

Colors	*Content of Liquid*	*Proportion*
8	1	2
7	1/2	1.5
6	1/2 X 2/3 = 1/3	1.5
5	1/3 X 2/3 = 2/9	1.5
4	2/9 X 2/3 = 4/27	1.5
3	4/27 X 2/3 = 8/81	1.5
2	8/8 X 2/3 = 16/243	1.5
1	16/243 X 2/3 = 32/729	1.5

"Liquids 8, 7, 6, 5, etc., give colors 8, 7, 6, 5, etc., with a depth (épaisseur) of 11.5 mm., i. e., in our tubes with the exterior dimensions of 13 mm. by 60 mm.

"The tints thus obtained may be kept a long time in an acid medium, in crystal tubes, if protected from the light.

"Liquid 9 should be faintly colored, since the test-tubes contain serum."

"It is interesting to note that once the scale is established tentatively, the nuances chosen by eye for the scale correspond, with perhaps slight correction, with a graduation such that the relation between two successive tints is constant, and corresponds, beginning with tint 7, to the logarithmic proportions of their content in colored particles.

"The variations in hemolysis obtained by this reaction with perethynal and pig's serum, according to the quantity of dissolved red corpuscles may be represented in figures by the number of the tint corresponding to the colorimetric scale.

"The tests are regulated so that normal human serum gives Tine 8, and the small variations in stability due to syphilitic serum are represented by a variation in hemolysis toward 0 (syphilimetric indices)".

By long study it has been possible to determine the modifications in the property of stability in syphilis under intensive specific treatment.

The results obtained by a study of many cases and of serological determinations may be summarized thus:

"(1) Every syphilitic infection is accompanied by a pathognomonic modification in the fluids, which disturbs their stability.

"(2) This pathognomonic modification may disappear under the influence of arsenical treatment, but whenever the treatment has been insufficient it reappears in from twelve to fifteen months, rarely in from fifteen to seventeen months.

"(3) When, in consequence of arsenical treatment, the absence of the pathognomonic modification persisted for eight months after the end of the treatment, *controlled by a normal lumbar puncture,* it has never been observed to reappear.

"*Conclusion*:—The determination of these indices (the basis of our syphilimetry) is founded on observations covering eight years' experience, which enable us to determine precisely the physical conditions necessary to a sero-reaction, which renders it possible to systematically unmask obscure cases of syphilis in every case, and to determine with security, after any treatment whatever, whether or not the patient is still infected."

GLANDS OF INTERNAL SECRETION

CRAMER: Zur Theorie und Therapie der Osteomalazie. *Deutsche medizinische Wochenschrift,* April 24, 1919, xlv, No. 17, p. 475. (Report of Sessions of Congress in Bonn.)

The author recalls an earlier case in which osteomalacia occurring during pregnancy was cured by castration, without interruption of the pregnancy. This experience would seem to indicate that the development of osteomalacia in pregnancy does not depend upon the increased demands made on the calcium content of the blood by the fetus, but upon ovarian function. The corpus luteum graviditatis increases the inner-secretory of the ovary, and itself represents an especially important innersecretory organ or product, as has been proven by cases of transplantation of the ovary. The grafting of the corpus luteum graviditatis in homoplastic transplantations showed rapid and marked results. The author has observed favorable results from the administration of milk from castrated goats to osteomalacic women. The relief lasted only as long as the milk was being taken, and when the treatment ended the symptoms reappeared.

In a discussion Garré called attention to the connection between bone formation and the thyroid and thymus glands. Just as the thyroid controls the iodin metabolism in the body, the thymus evidently regulates the phosphorus metabolism. In young thymectomized animals the bones show faulty development, and insufficient deposition of lime and of phosphorus salts.

PEARLMAN, I., AND VINCENT, SWALE: The Function of the Chromaphil Tissues. *Endocrinology,* April-June, 1919, iii, No. 2, p. 121.

The blood-pressure curve obtained in response to stimulation of the peripheral end of the cut splanchnic nerve is not a simple affair, but it is the same in dogs, cats, and rabbits. There is a sharp rise with a hump half way to the summit, followed by a dip nearly to the original level, and then a second rise. When the adrenal veins are clamped or tied, or both splanchnic nerves are cut and the adrenal veins cut or tied, the pouring into the circulation of large amounts of adrenin on stimulation is prevented, and the dip, which in the normal curve is due to this discharge of adrenin, is absent. If splanchnic (peripheral) and sciatic (central) nerves are so stimulated as to give a pressor response, the volume of the intact limb of an animal follows the blood-pressure curve, while the recently denervated limb shows constriction. In the denervated limb there is no active dilatation, and if the adrenals are clamped or tied off, there is no constriction, after stimulation. It appears then, that when there is a great discharge of adrenin into the circulation, constriction of the skin area results, with a dilatation of the vessels of the muscles, and that the chromophil tissue, particularly that of the medulla of the adrenals, has to do with the distribution of blood in the body, under great nervous or muscular stress.

BURGE, W. E.: The Effect of Adrenalin, Dessicated Thyroid and Certain Inorganic Salts on Catalase Production. *American Journal of Physiology,* 1919, l, p. 165.

The introduction into the alimentary tract of relatively small amounts of water (15 c.c.), of sodium chlorid 15.5 grains (1 gram), and of urea 31 grains (2 grams) per kilo, produces no increase in catalase, which is in keeping with Lusk's observations that small quantities of these produce no increase in oxidation. Large amounts (1,500 c.c. of water, 154.32 grains, or 10 grams of urea per kilo, and 10 grams of Na Cl per kilo) do produce an increase in oxidation. The injection of adrenalin into the portal vein stimulates the liver to an increased output of catalase and this suggests that the increased amount of adrenalin thrown into the circulation during combat may stimulate the liver to an increased output of catalase and in this way bring about the increase of oxidation occuring during combat. Dessicated thyroid introduced into the alimentary tract stimulates the liver to an increased output of catalase. This suggests that the increase of catalase of the blood which may be responsible for the increase in respiratory exchange of an animal when fed thyroid, or in exophthalmic goiter, is probably due to the stimulation of the liver with an increased output of catalase.

These observations are in line with previous attempts of this author to trace the significance of catalase as a measure of oxidation effects in the body.

MACHT, D. I., AND MATSUMATO, S.: Action of Some Ovarian and Corpus Luteum Extracts on the Pupil of the Frog's Eye. *Endocrinology,* April-June, 1919, iii, No. 2, p. 154.

Extracts of corpus luteum and ovary of the sow, from both dried and fresh gland, were used, equivalent in strength to 10 per cent of the fresh gland, and it was found that whether the fresh or the dried gland was used, corpus luteum caused a definite dilatation of the pupil of the frog's eye, in from thirty to sixty minutes. In some instances there was a very slight reaction with ovarian extract, which was interpreted to be due to the presence of lutein in the extract. The difference in reaction is so great, that so far as the effect on the pupil is concerned, the ovary and the corpus luteum are two different glandular bodies.

Mann, F. C.: The Effect of Splenectomy on the Thymus. *Endocrinology,* July-Sept., 1919, iii, No. 3, p. 299.

Observations were made on the thymus of adult dogs and puppies, kittens, adult and young rabbits, and adult and young goats, after splenectomy. No significant pathological changes were observed. But it was noted that there was a marked variation in the amount of thymus in individuals of the same litter, depending upon whether or not the spleen had been removed. A further observation was that kids, from which the spleen had been removed were less able to stand the strain of life.

Benedek, L.: Ueber die Auslösung von epileptischen Anfallen mit Nebennierenextrakt. *Wiener Klinischer Wochenschrift,* Dec. 16, 1918, xxxi, No. 52, p. 1,365.

In accordance with present-day notions the author states that the epileptic attack is probably a function of the entire brain activity and represents a combined hyperactivity. Hence any agent that changes the blood-circulation rapidly may induce a convulsion. Out of 19 cases of epileptics, hypodermic injections of a suprarenal preparation (Tonogen) caused typical attacks in seven cases.

THERAPEUTICS

Bernard, L. *et* Baron: Un Cas de Guérison de Tuberculose Pulmonaire par la Méthode du Pneumothorax Artificiel. *Bullétins et mémoires de la Société medicale des hôpitaux de Paris,* March 5, 1920, xliv, Series 3, p. 308.

The authors describe the case of a patient whom they treated successfully by the method of artificial pneumothorax. From 1908 to 1910 the patient—a policeman of thirty-three—had a series of hemoptysis. He entered the hospital in 1911, and was found, by roentgenologic examinations, to have tuberculous, caseous ulcers in the upper lobe of the right lung. There was no fever, but constant cough, and frequent expectoration of sputum containing numerous Koch bacilli. A rest cure resulted in little improvement, and in June, 1912 the authors gave the first insufflation to produce an artificial pneumothorax. The collapsing of the lung was difficult, owing to the adhesions at the base. Gradually the adhesions gave way and a good compression of the right lung was obtained, without grave discomfort to the patient, in spite of the high pressure used (+14, +20, and even +28 measured by the Kuss manometer). In four months, the cough had entirely disappeared and the expectoration was greatly diminished. The general condition was excellent, the temperature normal, and the patient's strength restored.

Insufflations were repeated on an average of every fifteen days, 57 insufflations being given. Twice, through the negligence of the patient, a month elapsed between insufflations, resulting in partial decompression and a return of the expectorations containing bacilli.

Treatment was interrupted in 1914, when the patient became a taxi-driver, and later entered the military service. During the war he discharged his duties as auto-driver at the front without a single day of illness. After his demobilization in 1919, he passed a medical examination and reentered the police service. His health at present is good, and there has been no recurrence of symptoms, in spite of the exposure and physical demands connected with his police duties.

A local examination showed the right side of the thorax to be flat and practically motionless during inspiration. Respiration

was diminished and rough and dry crepitations could be heard in the upper right lung, perhaps from friction. The roentgen-rays showed a marked deviation of the trachea to the right, greatly diminishing the size of the right pulmonary region. There was no dense zone in the upper right lung, surrounding a large clear cavity, but instead a marbled, spotted area, resembling a mass of bread crumbs. The outline of the cavity was softer and less dense than before treatment.

In short, the degenerative process in the active tuberculous cavities, accompanied by expectoration of sputum containing bacilli, has been arrested by artificial pneumothorax, and an almost complete functional cure has been effected, i. e., relief of the cough, and of the expectoration, and restoration of strength. The cure has been durable, as proven by the absence of symptoms after four years of exacting military service. Anatomically the cure is not complete; the lesions remain, although in a different form from those present before treatment was instituted. The lung has regained its place, although it is diminished in size by thoracic retraction.

De Silva, C. E.: The Treatment of Psoriasis by *X*-rays and Chlorin Ionization. *British Medical Journal,* 1918, i, 9-10.

Arsenic is the most valuable remedy and most constant in its results, but its administration is attended by remote ill effects.

The author reports a case with psoriasis localized to palms, backs of hands, and webs of fingers. Contrary to usual condition, the trouble was worse in summer than in winter. The *x*-rays gave marked relief. Recurrence in the spring one year later again gave way to mild doses of *x*-rays. A similar spring recurrence the following year was treated by chlorin ionization. Four treatments given within a month, left the skin normal and without the pigmentation occurring after the *x*-ray.

Auto-intoxication from defective metabolism, altered gland secretion, or absorption from the alimentary canal appeared to be the immediate and primary causative factor. Part of the nervous system is secondary.

Chlorin ionization is more efficient than *x*-rays; it is quick and settings can be continued as long as necessary without any ill effects; while application of rays must be limited, just sufficient to stimulate but not to injure or destroy skin. This means that in many cases the dose must be stopped before the involution of the eruption.

Electro-ionic treatment allows the introduction into each cell, impermeable to most remedies, of a whole series of ions and the obtaining of different actions to the desired degree and depth. Ointments, liniments and lotions act only superficially, and only an infinitesimal fraction can penetrate even to the deeper strata of the epidermis.

By electrolytic introduction, the ions are substituted for the ions of the organism and are not introduced into the circulation but into the plasma of the cells which retain them for a long time and ensure efficient and lasting action on the tissues.

Perry, A. P.: The Treatment of Psoriasis with Horse Serum. *Boston Medical and Surgical Journal,* 1916, lxxiv, 274.

Results of treatment with horse serum (in about 10 cases) tend to show that (like autogenous Serum) it is of little value in psoriasis when given alone, but that when combined with local or internal treatment it exercises, for some unknown reason, a favorable influence on the disease.

Van Alstyne, E.: The Protein Treatment of Psoriasis. *New York Medical Journal,* 1918, cviii, 326-330.

Walker (no reference) has found that administration of thyroid extract produces favorable results in psoriasis; the gland is commonly known to stimulate nitrogen metabolism. It is possible that the nitrogen retention of the psoriasis patient has its

origin in a deranged activity of the endocrines.

The writer has attempted by use of foreign protein as a vaccine to whip up or stimulate the metabolic process dealing with retained nitrogen.

Hypodermic injection may be given subcutaneously in the arm, begining with a dose of 6 to 8 minims of a 2 per cent solution and increasing gradually up to 20 or 30 minims. Injections are first given three times weekly. There is no inconvenience to the patient and improvement is slow and gradual.

So far 15 cases have been treated for a sufficiently long time to make it possible to say that very satisfactory effects are obtained, but, of course, no final conclusions as to its permanent curative value can be made.

One case of eighteen years' standing responded to six months' treatment and has remained without recurrence for a period of six months.

No patient seen by the writer can be considered to be in good health and the generally accepted dictum that psoriasis causes no impairment to the general health is hard to understand.

It is of interest to note that progressive improvevent with final complete relief has been obtained in some cases in which the treatment by a high protein diet has been continued throughout. The organism has apparently been educated to deal effectively with even the larger quantities of protein which the patients have been taking. No case has been restricted to a low protein vegetarian diet.

Montgomery, D. W.: Some Experiences with Radium in the Treatment of Psoriasis. *Medical Record,* 1918, xciv, 765.

Generally speaking, *x*-rays are of more value than radium in the treatment of psoriasis—they cover a larger surface, do not leave the disagreeable red marks so frequent after application of radium, and seem equally effective in influencing the patches. In some situations, and when the patches are of the deeply indurated type, radium seems to act better than the *x*-rays.

Barber, H. W.: Treatment of Psoriasis in the Army. *British Medical Journal,* 1918, i, 369-370.

(1) For generalized eruption on body and limbs, give a morning bath (on first two days, cresol 1 oz. and an alkali, are added).

After the bath and in the evening, the following ointment is applied:

Chrysarobin	gr. 10
Acid Salicylic	gr. 15
Acid Carbolic	gr. 10
Zinc oxide	dr. 1½
Lanoline } Vasoline }	aa ad oz. 1

Throughout the period of treatment a suit of pajamas is worn next skin night and day.

(2) Resistant patches:

Chrysarobin	gr. 20
Acid salicylic	gr. 25
Acid carbolic	gr. 10
Zinc oxide	dr. 1½
Lanoline } Vasoline }	aa ad oz. 1

(3) Treatment scalp and forehead:

Acid pyrogallic	gr. 10
Acid salicylic	gr. 15
Acid carbolic	gr. 10
Ung. hyd. ox. flav.	oz. 1

The above treatments have been uniformly successful in clearing up even the most extensive ulcerations in a short time; they will not, of course, prevent relapses.

Sabouraud, R.: Les Traitements internes du Psoriasis. *La Presse médicale,* 1920, xxviii, 53-54.

A review of medical literature shows that widely different measures, such as injection of mercurial salts, antitoxic serums (anti-

tetanic, antidiphtheritic, simple horse serum), and emulsions of killed microbes from the patients' stools have in certain cases a more favorable influence on psoriasis than could be hoped for. There is not the slightest specific action in any of these remedies; they appear to act on the general system and to influence the specific trouble in this manner.

The enterovaccine from the stools (Danysz method, Pasteur Institute) seems harmless. In a certain proportion of patients there have been practically no results; in other cases the result is very evident, very important for the patient, and sometimes it seems permanent.

(As in this article Sabouraud makes no mention of the baths of which he wrote so enthusiastically in 1916, it is fair to assume either that they were impracticable, or that recurrence followed).

Bory, L.: Le Traitement du Psoriasis par la Soufre Dissous. *La Presse médicale,* 1918, xxvi, 432-433.

Bory uses for injections the following formula:

Pure precipitated sulphur	1 gram
Guaiacol	5 grams
Camphor	10 grams
Eucalyptol	20 grams
Oil sesamon sufficient to make up emulsion of	100 c.c.

8 c.c. average injection, 6 c.c. minimum, 10 c.c. maximum.

Reaction appears in from 6 to 8 days after the injection; there is fever and sweating for twenty-four hours.

It is just as well before the first injection to analyze the urine and examine the lungs. As the emulsion is an emmenagogue, it should not be given to a pregnant woman.

The usual treatment is 4 injections at eight-day intervals. Local treatment is supplemented at once or after the second injection; this consists of painting the affected parts with pure oil of tar every day or every two days.

With this combined treatment, 2 injections (8-10 c.c.) are often sufficient, and nearly all the cases thus treated leave the hospital at the end of three weeks.

After dismissal, the patient is advised to take an occasional treatment—an injection once a month, or once every two months, for six months, and at greater increasing intervals later, with the hope of preventing recurrence.

Cook, A. H.: The Pathogenesis of Psoriasis. A Clinical Study; the Effect of Emetin Hydrochlorid. *New York Medical Journal,* 1916, civ, 255-257.

Out of ten cases treated with emetin hydrochlorid, there were 3 recoveries; of these all had pyorrhoea alveolaris with the Endamœba buccalis.

One patient with seminal vesiculitis was cured of his psoriasis after autogenous vaccine had eradicated former disease. Two patients, one with discharging fistula in ano and one with infected tonsils, recovered completely from psoriasis when the infected areas were treated. In a case of syphilis, the iodids and mercury had no effect upon the psoriasis. Two patients with psoriasis, but no other disease, were dismissed without relief.

The writer concludes that emetin hydrochlorid has no direct effect upon psoriasis. It is probable that the cures from emetin treatment were due to the killing of the Endomœba and the subsequent death of accompanying organisms.

It is suggested that the organisms most likely causing psoriasis were staphylococci and streptococci.

Fox, Howard: Human Serum and Blood in the Treatment of Psoriasis and Other Skin Diseases. *Journal Cutaneous Diseases,* 1915, xxxiii, 616-620.

Conclusions.—Injections of autogenous serum alone have no effect whatever upon

lesions of psoriasis. When given as adjuvant to chrysarobin, better results seem to have been attained in certain cases than when chrysarobin was given alone. This may be due to the blood-letting alone, or to the greater vigor with which the new method of treatment was carried out.

Dickson, W. E. C.: Vaccine Treatment. *Proceedings of the Royal Society of Medicine,* Section on Influenza, Nov. 14, 1918, xii, 78-79.

Since the beginning of the war physicians at the Fulham Military Hospital and the Royal Hospital for Diseases of the Chest have treated cases of bronchitis, bronchopneumonia, pneumonia, and allied conditions with vaccines. In most cases the author's vaccines were "mixed catarrhal?", but if sufficiently favorable results were obtained by their use, autogenous vaccine was administered.

The "mixed influenza" vaccine which the author used in the late epidemic was composed of:

Streptococci	5 parts
Staphylococci	5 parts
Pneumococci	3 parts
Minute Gram-negative influenza-like bacilli	3 parts
Friedlander's bacilli	2 parts
Other organisms (micrococcus catarrhalis, etc.)	2 parts

For prophylactic use a total of 60, 100, and 150 million organisms were given to adult males at weekly intervals; 40, 60, and 100 million organisms were given to adult females, and the amount of reaction produced by these doses appeared suitable in the majority of cases, being either practically absent or consisting of a slight rise in temperature, and, in some cases, of stiffness of the legs, neck, or of other parts of the body.

After testing the vaccine in the above dosage, on healthy persons, with good results, the author also tried it on influenza cases without pulmonary complications, with good results. Next it was given to patients with purulent bronchitis, bronchopneumonia, pleurisy, empyema, etc., at first in small doses (20, 40, 60, 80 million), at intervals of from three to four doys, according to the severity of the condition. In later cases the doses were increased, and the intervals were shortened.

The author has given the vaccine to about 500 patients, of whom only 2 have since developed anything resembling influenza. These 2 patients were ill at the time of the injection. One of these cases ran a mild course of a week, without complications. The other developed purulent bronchitis, but was doing well when last seen.

Brown, W. E.: The Home Treatment of Pulmonary Tuberculosis. *Virginia Medical Monthly,* Jan., 1920, xlvi, No. 10, pp. 254-7.

Although sanitorium treatment for a time at least is advisable in pulmonary tuberculosis, much may be done for the patient at home.

Prophylaxis.—Sanitary sputum-cups and gauze handkerchiefs are essential. They must be burned immediately after use. Individual toilet articles and dishes, etc., must be provided, and bodily cleanliness and frequent bathing insisted upon. Rest and plenty of good food and fresh air are useful in strengthening the resistance of the individual to infection.

Medical Treatment.—This should be limited to the alleviation of intercurrent symptoms or complications. The majority of cases of indigestion complicating active tuberculosis are due to a lack of hydrochloric acid in the gastric juice. These cases are often markedly benefited by giving from 10 to 20 minims of dilute hydrochloric acid in water after each meal. Pleurisy can be treated, according to its nature, by counter-irritation, such as blisters, or painting with iodin. For hemorrhage, vasomotor depressors are indicated, such as the inhalation of

amylnitrite, or the use of nitroglycerin and sodium nitrite, to keep the blood-pressure reasonably low. The cough should be controlled as quickly as possible by the use of small doses of codein, morphin, or heroin.

GENERAL TREATMENT.—This consists in diet, fresh air, and rest. The extravagant use of raw eggs is no longer advocated. Most stomachs will reach a limit of toleration, and from that point on more harm than good will be done. Three good, substantial meals per day, with a glass of milk at each meal, and one between meals, are sufficient for the average case. When the digestion is poor it may be well to use more milk than in a case where the patient can assimilate a general diet. Absolute rest in bed is most effective, and fresh, pure air is essential.

EDITORIAL: A Vaccinotherapia na Influenza. *Brazil-Medico,* Feb. 14, 1920, xxxiv, No. 7, p. 102.

For three years experiments have been made with sera and vaccines in influenza cases. Dr. Lochelongue reports the results obtained by the use of vaccines from the Pasteur Institute, first formula, containing:

Pfeiffers' bacilli	2 billion
Pneumococci	4 billion
Streptococci	2 billion

He obtained excellent results in grave cases of influenza in Epinal. The mortality from the disease was greatly reduced.

On the basis of these results, and of those obtained by other investigators, Dr. Lochelongue formulated the following conclusions:

(1) Only grave cases, with unfavorable prognosis, were treated.

(2) All properly treated cases were completely cured.

(3) In the few unsuccessful cases the failure was attributed to incomplete treatment.

The Pasteur Institute prescribes treatment lasting four days: On the first day, ¼ c.c. is given; on the second day, ½ c.c.; on the third day, 1 c.c.; and on the fourth day, 1½ c.c., in two injections. Some of the Epinal physicians failed to give the requisite number of injections—a grave mistake, presupposing the existence of a negative phase.

Others gave one or two injections of antistreptococcic serum, according to whether the temperature rose or fell. Later it was found best to modify the vaccine in accordance with the gravity of the condition.

Serum containing 5 billion streptococci and 5 billion Pfeiffer bacilli injected at the subsidence of the fever, gave good results.

Excellent results were also obtained in the cases of: an infant of ten months suffering from broncho-pneumonia, a man of sixty-eight with influenza-pneumonia, and a woman of eighty-two, who had two successive foci of broncho-pneumonia, appearing at an interval of three days; these foci disappeared under the influence of treatment (6 injections in each case).

It was observed that in the case of old persons the therapeutic action of the vaccine diminished the duration of fever, lowering the temperature, but never before the sixth injection. In nearly every case of an adult the fever was markedly reduced, and the temperature fell after the fourth injection, and occasionally after the third.

The mortality in pneumonia cases is diminished by vaccine therapy.

Dr. Lochelongue has observed a diminution in the number of bacteria in the serum examined after vaccine therapy.

It is to be recommended that vaccine and clear instructions for its use be widely distributed, for the purpose of preventing epidemics such as that of 1918.

TAKAKI: A Efficacia da Adrenalina no Tratamento das Suores Nocturnos. *Japan Medical World,* xxxi, No. 8, p. 919; abstr. *Brazil-Medico,* Jan. 3, 1920, xxxiv, No. 1, p. 14.

Takaki claims that epinephrin possesses the power of absolutely preventing night

sweats in tuberculosis. The efficacy lasts three days. In cases of individual hypersensibility to the drug, 10 c.c. of physiologic solution of sodium chlorid (chloreto de sodiu) may be given.

If there is no improvement after the first injection, it may be repeated in the same quantity, at intervals of a day. After the third injection, if large doses are given, the desired result is obtained.

Injections of 0.7 c.c. have been given, but probably much larger ones may be given. Diabetes, myocarditis, and pulmonary hemorrhage constitute contra-indications to the use of the drug.

MISSERVY: Tratamento das hemoptyses Graves pelo Nitrito de Amyla. *Brazil-Medico,* Jan. 3, 1920, xxiv, No. 1, p. 5.

The author has found inhalations of amyl nitrite most efficacious in checking hemoptyses in grave pulmonary cases. The treatment must be given promptly. A tube is inserted into the patient's nostrils, and the mouth closed, so that he can inhale only the amyl nitrite. The tube is kept in place until the chest is congested with the vapor. The sooner the congestion occurs the better and the sooner the hemoptysis will be checked. In some cases one tubefull is sufficient; in others, two or even three are necessary. The author has never observed the slightest ill-effect pursuant to this treatment. The following methods are recommended:

(1) Prompt inhalation of amyl nitrite, repeated every time there is hemoptysis.

(2) Quiet and silence on the part of the patient, to prevent cough.

(3) Immediate injection of 1 cg. morphin, and, after four hours, of ½ cg., repeated every four hours.

(4) Abstention from solid foods and iced drinks.

(5) The administration of ipecac.

The author attributes the beneficial action of the drug in checking hemorrhage to its anemia-producing effect upon the lungs. Now that it is possible, by means of these inhalations, to check dangerous hemorrhages, the fatality of the disease may be greatly reduced.

EDITORIAL: Protection against Poliomyelitis. *Journal of the American Medical Association,* April 3, 1920, lxxiv, No. 14, p. 952.

The use of nasal antiseptics as a protection against poliomyelitis has been highly recommended. However, Flexner and Amoss have not had particularly favorable results with such antiseptics, in the case of chronic meningococcus carriers, and the microbe of poliomyelitis is more resistant than the meningococcus. They also found that chloramin-T and dichloramin-T, dissolved in chlorosane, possessed little prophylactic value.

The question has arisen as to whether antiseptic chemicals applied to the mucosa may not be actually injurious. This membrane is thought to function normally to prevent infection. Certain animals are highly refractory to inoculation with the virus of poliomyelitis by way of the nares, apparently because the membrane has the power to destroy or render innocuous the virus which comes in contact with it. The length of time the virus may survive depends upon the functional efficiency of the membrane.

This property of the nasal mucosa seems to be distinct from any specific protective virtues of the blood. The poliomyelitic immune serum is thought to meet the virus in the subarachnoid space. The low morbidity, even in severe epidemics of poliomyelitis, leads one to the belief that some individuals possess some peculiar means of protection. If the normal nasal mucosa is part of the defensive system, it should be conserved in a normal, healthy state. Local antiseptics are often merely chemical irritants and they should never be used indiscriminately, especially in poliomyelitis.

RODET, A., AND BONNEMOUR, S.: Serotherapie de la Fievre Typhoide. Mode d'Emploi du Serum. Resultats Cliniques. *Bulletin de l'Académie de médicine,* June 3, 1919, lxxxi, No. 22, pp. 759-61.

Serum treatment in typhoid fever should be begun as early as possible. The best results are obtained if the injections are given before the twelfth day, although the serum should exercise a favorable influence at any time, especially if the typhoid is not complicated by any other infection. It should therefore be given in every case.

The first dose should be 15 or 20 cu. cm. If, less than forty-eight hours after the injection, there is a fall in temperature, the authors postpone the next injection as long as the defervescence progresses. As soon as the curve remains stationary or rises, they give a second injection, usually of from 10 to 15 cu. cm. If there is no defervescence after the first injection the second is given earlier. The same rule applies to the administration of the third injection of from 5 to 10 cu. cm. Usually two injections suffice, or even one. But in some cases a third or even a fourth injection is advisable, the later being from 5 to 10 cu. cm. A fifth injection is very rarely indicated. Often, after a phase of amelioration of short or long duration, it is necessary to administer the serum again to relieve a recrudescence or a relapse.

The authors have never observed an immediate thermic rise, such as follows other therapeutic agents (vaccine, colloidal metals). Frequently, on the evening following the first injection, or the next day, there is an evident fall in temperature. Sometimes, after a marked fall, the curve rises again almost immediately, describing a sort of "notch", which is a favorable prognostic, nearly always indicating an approaching lysis. A number of the author's tracings show large undulations, corresponding with the successive injections. It is very seldom that the temperature remains at the same level for a long time, as is the case when other methods of treatment are used. If, after three injections of the serum, the temperature has not decreased, it is fair to assume that one is dealing with some infectious state other than typhoid fever, or with a combination of typhoid with another infection.

Even more striking than the effect of the serum upon the temperature is its effect upon the general condition of the patient. After the first injection, even before the decrease temperature, the patient usually falls into a tranquil sleep, a veritable euphoria. The prostration and headache decrease rapidly; the pulse, if it was accelerated, slows down; the tongue improves and becomes moist; the urine more abundant. In short, the cases treated by this method run their course with a minimum of toxic phenomena.

The authors do not consider that the serum treatment is ever contra-indicated. The severity and long duration of the attack, hemorrhages, etc., far from being contra-indications, furnish all the more reason for acting quickly.

Out of 120 cases treated by serum injections, the authors have observed 7 deaths, a mortality rate of 5.8 per cent. In those treated before the twelfth day the mortality raate was 2.9 per cent. In the cases which terminated in death autopsies revealed the presence of superimposed infections. In 6 cases intestinal ulcers were found.

The authors consider that serotherapy for typhoid fever should be placed at least on the same plane of efficacy with balneation. "It acts equally favorably on the toxic troubles, and it has the advantage over the baths of being more easily applicable, of disturbing the patient less, and of curtailing the duration of the illness.

ANDERS, J. M.: Transfusion of Blood in Pernicious Anemia. Report of an Interesting Case. *American Journal of Medical Sciences,* Nov., 1919, clviii, No. 5, p. 659.

The patient received 500 c.c. of whole blood on two occasions, at ten months' interval. Arsenic and iron were given for a per-

iod following the first operation. The patient is now, just one year after the first transfusion, in remarkably good condition. Many references are given to the literature which pertains directly to cases of pernicious anemia.

HYGIENE AND PUBLIC HEALTH

Brown, C. P., Palfrey, F. W., and Hart, L.: Typhoid Fever Occurring after Prophylactic Inoculation. *Journal of the American Medical Association,* Feb. 15, 1919, lxxii, No. 7, pp. 463-8.

The authors' purpose is to show that the protection of prophylactic inoculations, great as has been their service, cannot be taken as absolute and that sanitary precautions cannot be neglected.

Vaccination against typhoid fever is now practiced as a routine in all armies. Sanitation and the technic of vaccination have improved, and yet occasional cases of the disease have occurred. The authors report cases of the small epidemic of June, 1918 at Camp Greene, N. C. In most cases the individuals had had the regular prophylactic injections within a year at proper intervals, as was proved by the soldiers' statements and their service records. The fact that they had received the preventive inoculations at different times and at different camps, together with the known care with which the army vaccine is prepared, rendered it unlikely that the failure of immunity was due to defects in the preparation, or to faulty administration of the vaccine.

Much more probable was the exposure of these patients to massive doses of the infecting agent, against which the immunity produced by the standard process of vaccination was inadequate. On one conclusive source of infection was proved, but most of the cases occurred in one locality and organization and during the same period, and thus some source of marked virulence must be assumed.

Cultural examinations of blood, urine, and feces were made. Cross-agglutination tests were done on two different occasions, patient's serum and cultures being used. The results indicate the possibility that a vaccine containing a number of strains may give greater protection. The variability of agglutinations with freshly isolated cultures of *Bacillus typhosus* was noted. Tests were made as follows:

"(1) Agar cultures grown twenty-four hours at 37.5° C. (99.6° F.)

(2) Broth cultures grown twenty-four hours at 37.5° C. (99.6° F.)

(3) Dreyer's agglutinating fluid. Broth cultures were transplanted for two weeks at daily intervals; a few drops of the last transplant were planted into bottles containing 100 c.c. of both, incubated for twenty-four hours at 37.5° C. (99.6° F.) and then 0.1 c.c. of liquor formaldehyd was added. The bottles were placed in the ice-box, shaken daily for a few minutes, and after a period of five days were used in the agglutination tests."

The tests showed a wide variation both as regards individual strains, and as regards the preparation of the agglutinating fluid by different methods.

The authors' work "confirms that of others, showing the desirability of using standard agglutinating fluids for Widal tests. The work also strongly suggests that the same method should be used in checking the agglutination of patient's serum with the homologous strain."

It is to be concluded that occasional cases occur in which the usual preventive inoculations against typhoid fever fail to protect, probably on account of the ingestion of virulent organisms in massive doses. To elimi-

nate such infection, sanitary precautions should prevail, including the careful guarding of food and water against contamination by flies, carriers, etc.

GREEN, W. P.: Poliomyelitis: An Epidemiological Study, with Summary of Treatment during Convalescence in Minnesota. *Minnesota Medicine,* July, 1919, No. 7, pp. 256-69.

In 1907 Wickman formulated the theory that poliomyelitis was spread by contact, that non-paralyzed or abortive cases and healthy carriers were numerous, and played an important part in transmission.

Of the 912 cases of the 1916 epidemic, 145 were considered as probable secondaries.

The author has studied non-paralyzed cases which give a history of exposure to a known paralyzed case. Other possible etiological factors, such as season, insect bite, dust, etc., were excluded.

Immunity seems to form an important preventive factor against infection. One attack apparently protects for life.

In some localities an epidemic of the disease among children was traced to the public baths, where the children dressed in overcrowded rooms with ample opportunity for contagion. The epidemic abated as the individuals acquired immunity.

In one instance a newly-adopted child came from an orphan asylum where no cases of poliomyelitis had occurred but which was in a vicinity where an epidemic was raging. The child slept with the small son of her foster parents. It developed paralysis and died. The funeral was attended by other children, and there was a dinner. Within a week, 2 cases developed in individuals who had attended the funeral.

In another instance a man who had been exposed to the disease drank water from a glass in a friend's house. Nine days later the friend's child developed paralysis and died. Two other children had symptoms without paralysis.

In one case all members of a family drank out of a common dipper, except the eldest son. One after another all developed the disease, including a child who was visiting them, but the eldest son was free from symptoms.

Other similar cases of contagion are cited.

The State (Minnesota) Board of Health has recommended certain methods for after-cure. These include operations, under the supervision of an orthopedist, braces, hospital care, and supervision by district nurses.

NYDEGGER, J. A.: School Hygiene as a National Problem. *American Journal of Public Health,* June, 1919, ix, 444.

"When we consider the existence of diseases in country and city children, we find, notwithstanding all advantages of fresh air and out-door life, that 3.7 per cent of the total number of country children have tuberculosis of the lungs, while city children with lung trouble make up only a fraction of one per cent."

EASTMAN, P. R.: The Relation of Parental Nativity to the Infant Mortality of New York State. *American Journal Diseases of Children,* March, 1919, xvii, No. 3, pp. 195-211.

The author gives tables and statistics of the infant mortality rate in New York State (exclusive of New York City), as compared with that in different communities in this country and Europe.

Of the total number of deaths occurring within the first day after birth, over 60 per cent are due to premature birth, 13 per cent to congenital debility and malformations, and nearly 15 per cent to injuries at birth, amounting in all to about 88 per cent. There were 1,987 deaths under one day old, or 20 per cent of the total under one year. The author summarizes the data as follows:

(1) The infant mortality under one year in this state compares favorably with that of most communities of similar size.

(2) This is due to the steady reduction which has been brought about in the infant death-rate in New York State during the past decade.

(3) This reduction has taken place principally among children over one month old.

(4) The great majority of the deaths of children above one month of age are caused by communicable, respiratory, and gastro-intestinal diseases.

(5) About three-fourths of the infantile deaths under one month of age are due to prenatal causes.

It appears that the mortality of babies under one month old is higher among those born to native mothers than among children born of women of foreign nativity. Although the mortality of children under one year, born of native women, was only 87 per 1,000 births, as compared with 108.4 for children of foreign mothers, the rate under one month for the former was 47.4 as against 45.2 for the latter. The infant mortality of the children of native mothers, over one month of age and less than one year, was only 39.6 as contrasted with 63.2 for babies born to foreign mothers.

The extraordinarily high mortality for colored babies is noteworthy. "By dividing the total foreign-born mothers into two main groups, one composed of Italians, Russians, Poles and Austro-Hungarians (comprising about 73 per cent of the total mothers of foreign birth), and one consisting of all others of foreign nativity, we find that the lower mortality of babies under one month of age of foreign parentage is found principally in the first-mentioned group. The second group showed even higher rates under one month than did the children of native mothers. Accordingly, it may be inferred that infantile deaths from prenatal causes are particularly numerous among the children of native women and, of foreign women, of other than Italian, Russian, Polish or Austro-Hungarian birth. In the latter class, however, one may expect to find the majority of deaths to be caused by communicable, respiratory and gastro-intestinal diseases, since the infant mortality between the ages of one month and one year for children of these mothers is over 59 per cent greater than that incident to native mothers' babies of the same ages."

The infant mortality from communicable disease was almost 75 per cent greater among children of foreign mothers than among babies of native mothers; from respiratory diseases it was over 100 per cent greater; and from gastro-intestinal diseases the excess was about 78 per cent; but the rate from prenatal and other causes peculiar to early childhood was higher among the native element by over 26 per cent.

In short, the chief causes of infant mortality among the native population originate, for the most part, in adverse prenatal conditions, but among the foreign element, and especially the Italians, Poles, etc., the most frequent causes of death are communicable, respiratory and gastro-intestinal diseases.

The statistics for cities of predominantly native, and for those of predominantly foreign stock corroborate these findings and indicate the problems to be met for each community.

Summary.—"It is evident that the several causes culminating in the present high mortality of infants are strongly influenced by the customs and racial characteristics of the various people inhabiting the state.

Among the foreign-born, particularly the Italians and Slavic races, the principal diseases are the communicable, respiratory, and gastro-intestinal. Since these diseases may be said to arise from unfavorable sanitary environment, it is not to be wondered at that they are the dominant causes among the foreign-born population, the majority of whom are poor, illiterate, without knowledge of English, and almost wholly ignorant of the elements of modern sanitation, and inhabit, as a rule, the most congested districts of the large manufacturing centers."

"The fewer deaths from prematurity and congenital defects among children of Italian, Russian, Polish and Austro-Hungarian parents may possibly be accounted for in part, by the greater vitality and superior constitution of these infants. There is all the

more reason to deplore the excessive mortality incident to them during the latter months of infancy, since it would seem that if it were not for the ignorance of their parents they would actually start life with a better chance of survival than do other children.

"It is likely, however, that the more general knowledge of contraceptive devices and of artificial methods for the prevention of child-birth, together with the more common occurrence of venereal disease and chronic alcoholism among the rest of the population are more directly responsible for the higher infant death rate from prenatal causes within this group.

"Whatever the primary cause may be, the death rate from prenatal causes is exceptionally high among the children of native mothers, and that is the main factor to be considered in any campaign for the improvement of child welfare in a community populated by this element. On the other hand, in a community composed largely of Italians and Slavs, the principal causes to be combated are those arising from poverty, ignorance, over-crowding, and imperfect sanitation."

A careful study of the character and habits of the population should be the first step taken in any attempt to improve child life.

Richardson, F. H.: A Model Pediatric Service for the Modern General Hospital. *Archives of Pediatrics,* Feb., 1920, xxxvii, No. 2, pp. 93-102.

The author points out the necessity for a special pediatric department connected with every hospital. "The usual tendency seems to be to tag a children's ward and a children's service to the tail of a general medical, fill the ward with a general hodge-podge of surgical, medical, and orthopedic cases, which have nothing in common but a relative similarity of ages, and let each attending physician treat there all of his cases who happen to be under twelve years of age." Such a ward has no settled plan. The chief of the ward cannot treat the patients of other physicians. The surgeon or other specialist may not understand infant feeding and may therefore do much damage before the pediatrist is called in. All physicians treating children should do so under the direction of a pediatrist.

The duty of the hospital, and therefore also of the pediatric service, is (1) to cure the sick, (2) to instruct the medical fraternity of the community, and (3) to educate the lay portion of the community in matters pertaining to individual and collective health.

The consulting pediatrist of a department such as that suggested by the author should be available at all times. The attending pediatrist should make his rounds at a regular fixed time every day, and should visit only a few cases each day, instead of paying a perfunctory visit to all the patients. He should spend enough time with each patient visited to study the case thoroughly, and to teach the associates and clinical assistants who make the rounds with him the important aspects of the cases.

There should be a weekly period, the "Grand Rounds", when each case is discussed and the events of the week gone over by the whole staff in the light of any new developments that may have taken place. Assignment of special topics for preparation outside may be made at this time.

A weekly "general didactic clinic" for the entire hospital staff and outside visiting physicians would also be of great value and interest.

There should be two associate-attending physicians, one in direct charge of ward work, the other the chief of the clinic. The associates' duties are to act for the attending physician in his absence and to see and treat daily all the cases in the house except those under the special care of the chief on his didactic rounds. He must supervise the diet, formulas, etc., for the infants, and be informed of all that goes on in the ward.

The chief of the clinic should not only attend, but also teach the clinical assistants,

and oversee the therapeutic policy of the service, arrange the schedules, assign cases, etc. Each physician should be given opportunity and should be expected to contribute some research work on pediatrics every year; a hospital year book of the results would be of great interest.

KISSKALT, K.: Zur Sterblichkeit der Kinder im ersten und im zweiten Lebensjahre, insbesondere an Magendarmkrankheiten. *Deutsche medizinische Wochenschrift,* May 22, 1919, xlv, No. 21, pp. 570-571.

The author gives tables and a graph to illustrate the gradual fall in infant mortality from 1895 to 1913. The curves for nurslings and for two-year-olds run practically parallel, showing the same gradual fall, and the same temporary rises during hot summers or epidemics, especially on account of stomach and intestinal diseases.

"It is to be assumed that the second year of life the gastro-intestinal tract is still highly susceptible to bacterial infection.

"It is remarkable that the mortality rate in the second year of life has fallen in exactly the same manner as has that of nurslings, although child-welfare (as compared with infant-welfare—Abstr.) has developed only within the last few years. This . . . would seem to constitute a warning against attributing to child-welfare work too great a rôle in the reduction of infant mortality."

BERGHOFF, R. S.: Measles a Prodisposing Factor Towards Pulmonary Tuberculosis. *Illinois Medical Journal,* Feb., 1919, xxxv, pp. 62-64.

Measles has long been considered a predisposing factor of tuberculosis. Early in 1918 the Surgeon-General ordered an investigation of the relationship existing between the two diseases. Only frank cases of measles with a diagnosis based upon a typical skin eruption, Koplick's spots and leukopenia, were included. In nearly all these cases the patients had recently been examined for tuberculosis, and the records on file formed a check on the measles investigations. In all, 596 cases of measles were examined for tuberculosis 14 days after admission to the hospital, and again 6 weeks after admission. The tabulated results follow:

Month	*Total No. Cases*	*Found Active T. B.*
February	263	0
March	219	1
April	36	1 (?)
May	15	0
June	34	0
July	13	1
August	16	0
Total	596	3

Of the 3 cases showing recent reactivation of an old tuberculosis directly attributable to measles infection, only one, on the second examination, had suspicious findings, chiefly crepitant râles in the upper right lobe, which persisted after cough. On the third examination, a month later, the chest had cleared up entirely. "In the second case it was found . . . that the patient had been under observation in the Tuberculosis Clearing Station on suspicious findings a week prior to his admittance to the base hospital for measles.

"In conclusion, of 596 cases examined, only one was a frank example of an active pulmonary tuberculosis resulting directly from measles. These figures, and similar ones gathered in other cantonments, seem to vitiate another favorite theory, that measles is a predisposing factor toward pulmonary tuberculosis."

REPORT OF ROYAL INSTITUTE OF PUBLIC HEALTH, LONDON CONFERENCE: Section V. Tuberculosis Problems Under After-War Conditions. *London Lancet,* July 12, 1919, pp, 62-63.

Dr. H. J. Thomson gave statistics showing the increased mortality from tuberculosis in

England and Wales, and urged the necessity of sanatoria where patients could be kept until cured. The segregation of acute cases should be provided for and adequate treatment ensured.

Dr. W. D. Bardswell urged voluntary segregation of tuberculous individuals in a community, which should be supervised and made healthful and attractive. Small garden cities would be best, in which the patient could work for the remainder of his life under favorable conditions. Ordinary industrial occupations for those capable of prolonged work would ensure some economic independence. This plan would be especially valuable in the case of the pensioned soldier, who could perform some work but could not compete with well men.

Lieut. Col. W. M. Hart emphasized the importance of an accurate diagnosis and of educating the general public as to tuberculosis and its prevention. He stated that tuberculosis has not increased in consequence of the war, and that in fact the out-of-door life has restored many men to health who might otherwise have broken down.

REPORT OF COMMITTEE ON TUBERCULOSIS POLICY: Presented to the Conference of State and Provincial Boards of Health, June 6-7, 1919, at Atlantic City, N. J. *American Journal Public Health,* Aug., 1919, ix, 610.

Resolutions were given as submitted in 1918, with additions by Dr. Palmer:

(1) Tuberculosis is a social, as well as a sanitary problem, and therefore control should be provided for by the state.

(2) Tuberculosis should be reported to the state health authorities.

(3) The removal of a case of tuberculosis from one state to another should take place only on the reciprocal notification plan of the conference and under rules approved by the State Department of Public Health.

(4) Each tuberculous case should be under sanitary supervision, *i. e.,* the Board should see that each patient is living so as not to endanger others, and should advise the patient and his family as to how to avoid infection.

(5) Each early case of tuberculosis should be treated, so as to ensure recovery if possible.

(6) Early cases should have sanatorium treatment for the purpose of:
 (*a*) Ensuring medical dietetic and and psychic treatment.
 (*b*) Educating patients as to the proper mode of life.
 (*c*) Controlling the disease.

(7) "Open" cases should never be treated at home where there are children.

(8) Such cases should have sanatorium treatment, in order:
 (*a*) to cure the patient and
 (*b*) to control the disease.

(9) Institutional provision should be made for two classes of patients:
 (*a*) Hospitals for advanced cases.
 (*b*) Open sanatoria for early cases.

(10) The erection and operation of all public tuberculosis Sanatoria should be under general state supervision, or the Board of Health or a Committee.

(11) Sanatoria should be so conducted as to make the patients want to stay. Happiness is essential to recovery.

(12) If tuberculous soldiers or sailors are discharged from service, the health officials of the home district should be informed, so that the patients can be cared for at their destination.

(13) Cases discharged from sanatoria should be followed up through social service standardized under the state Board of Health. Therefore all public health nursing and social service should be under the state Health Department.

(14) Special institutions should be established for incorrigible cases.

(15) As an early diagnosis is essential to a cure, the state health departments should endorse the establishment of

free tuberculosis dispensaries under government or extra-government agencies, and should set the standards for the dispensaries.

(16) As tuberculosis causes from 1/10 to 1/8 of all deaths, all State Departments of Health should maintain separate divisions for tuberculosis under a chief experienced in the medical and social aspects of the disease.

Dr. McCormack suggested also that recovered cases of tuberculosis be trained in vocations conducive to health.

WAR MEDICINE AND RECONSTRUCTION

UNGER, L.: Typhoid and Paratyphoid in Vaccinated Troops. *Illinois Medical Journal,* Feb., 1920, xxxvii, No. 2, pp. 101-103.

The author reports 25 cases of typhoid and paratyphoid in soldiers, all of whom had received at least one course of inoculation against these diseases during their service in the army.

In most cases the fever was not as typical as in civilian patients, and in most cases it subsided quickly. The pulse was usually slow in comparison with the fever. Many of the patients had taken part in strenuous marches, and this was undoubtedly a weakening factor.

"These cases, though few in number, point conclusively to the fact that anti-typhoid inoculation is only a partial protection. Fifteen of the 25 had been inoculated more than a year previously, 10 within the last year, and yet they fell victim to the typhoid diseases. Obviously we cannot afford to lessen our sanitary precautions, but must be even more careful than previously . . . Reinoculation should be done at least once a year.

"The very low mortality (4 per cent) is undoubtedly to be attributed to the previous inoculation. This process seems also to greatly lessen the severity of the disease".

In none of the cases was there any history of previous typhoid or of any typhoid or paratyphoid among the soldiers or civilians in the vicinity.

In conclusion, the author emphasizes the need for repeated inoculation against typhoid, and necessity for care in sanitation.

HAWN, C. B.: An Outbreak of Typhoid Fever in Inoculated Soldiers. *Proceedings of the Royal Society of Medicine (Section on Epidemiology and State Medicine),* Nov. 8, 1918, xii, 1.

The author describes a number of cases of typhoid occurring in inoculated soldiers. The clinical course of the disease was typical in all cases. The results obtained by the "atropin test" (on 36 typical cases) were noteworthy.

"An acceleration of pulse-rate occurred in 33 cases, a decrease of rate in 1 case. No alteration in rate occurred in 2 cases. Twenty-three of the 36 cases showed a positive reaction (either a decrease, no alteration, or an increase of less than fifteen beats). The earliest day on which the test was performed in this group of 36 show a positive reaction in 63.8 per cent of cases. Of the 11 cases showing an acceleration of fifteen or more beats, the test was performed later than the thirtieth day of the disease in 7 cases, and on none was the test done earlier than the twenty-first day. Accuracy is not claimed for tests done later than the thirtieth day. . . . If we eliminate the 7 cases just mentioned, the percentage of positive results on the whole series of 36 cases would be 79.3 per cent."

Conclusions.—"(1) The fact that all of the men had received routine immunizing vaccine during the past eleven months made the ordinary Widal reaction unreliable. Careful clinical study, however, justifies a positive diagnosis in 38 of the cases.

"(2) That severe typhoid may occur in vaccinated men is proved by this series of cases."

STERN, A.: Uber Poliomyclitis im Heere. *Deutsche medizinische Wochenschrift,* Jan. 9, 1919, xlv, No. 2, pp. 40-41.

There are few reports of cases of poliomyelitis occurring in the German army. But in the ward for nervous diseases of the military hospital on the eastern front, where the author was stationed, 5 cases of the disease occurred within a short time. Most of the patients in the hospital were from the Ukraine.

CASE 1.—The patient was a man of twenty-four years. He had had a three-day attack of grip in June. In August, fever set in, 39.8° C. (102.64° F.), followed by paralysis of the legs, inability to urinate, constipation, backache, and cold feet. The abdomen was soft, not swollen; there was paralysis of the abdominal muscles. The abdominal muscle reflexes were lacking, the cremaster reflex was negative, knee and Achilles reflexes negative, toe reflex plantar. Babinski position was obtained, and dorsal flexion of the large toe. There was some paralysis of both legs, with hypotonia. The right leg could be rolled somewhat. There was slight plantar and more pronounced dorsal flexion in the foot. In the left leg the rolling and toe movements were slight. Sensibility was intact. Mobility gradually returned. The condition was diagnosed as poliomyelitis acuta anterior dorsolumbalis.

CASE 2.—The patient was forty-three years old. In May or June he had rheumatic pains in the right leg. From July 27 to August 31 there was fever to 39° C. (102.2° F.), with rheumatic pains in the right leg and left shoulder, and general fatigue. He was treated for "Spanish sickness" (influenza—Abstr.). There was increasing weakness in the left arm, heavy gait, especially in the right leg, vasomotor disturbances in the left arm. On examination the inner organs and cerebral nerves were found to be normal. There was atrophic paralysis in the region of the left shoulder, and lack of function of the left cucullaris. Outward rotation of the arm was impossible, inward rotation difficult. Clenching and extension of the hands, and finger movements were normal, but slightly weaker than usual. Both hands (especially the left) were cool and cyanotic. Lumbar puncture gave fluid microscopically poor in cells and protoplasm. Cultures yielded diplococci. The diagnosis was poliomyelitis anterior acuta cervicalis sinistra.

CASE 3.—The patient was twenty-three years old. In August he had an attack resembling grip. In September he had pain in the left femur, following trauma. Eight days later he reported with fever of 38° C. (100.4° F.) which lasted two or three days. There was gradual weakening of both legs, followed by total paralysis of the left leg. The knee reflex right side was positive; left side, negative; Achilles reflex, right side, positive, left, negative; toe reflex, right side, partial, left negative. The left hip muscles were involved by paralysis and were hypotonic; there was slight atrophy, sensibility to pressure on the muscles and nerve branches. In the reglon of the left femur there was hypesthesia and hypalgesia, extending over the entire left side of the trunk. There was slight chilling and cyanosis of the left foot. The mobility of the left leg improved somewhat under treatment. The condition was diagnosed as poliomyelitis acute anterior lumbosacralis sinistra with hysterical complications (trauma).

CASE 4.—The patient, who was thirty-eight years old, had fever in September, followed four days later by weakness in the neck, both arms, especially the left, and both legs, with pain in the lower extremities. At first there was retention of urine, and constipation, and also difficulty in speaking. Improvement followed in eight days. There were similar cases in the field hospitals and striking mortality among the chickens in the vicinity. When the patient was receiv-

ed at the lazarett, there was slight deviation of the tongue to the right. The left corner of the mouth was depressed. There was marked paresis of both legs, with hypotonia, especially in the region of the hip and knee. The flexion of feet and toes was strong on both sides. The quadriceps did not function on the right, but was more normal on the left. The knee reflex was weakly positive on the left, negative, on the right; the Achilles reflex was positive on both sides; the toe reflex was plantar; the cremaster and abdominal reflexes were positive. There was slight paresis in the left shoulder muscles (deltoideus, serratus). The arm reflexes were positive on both sides. There was gradual improvement. The condition was diagnosed as poliomyelitis acuta lumbalis et cervicalis (with involvement of the brain).

Case 5.—The patient was thirty years old. The illness began with fever lasting five days, and increasing weakness of the legs. At first there was retention of urine. The author notes the fact that great mortality among chickens was noted in the vicinity. Examination of the patient showed a paralysis of both legs, except for slight dorsal flexion of the left foot. The knee and Achilles reflexes were negative on both sides; the abdominal and cremaster reflexes were negative. Sensibility was normal. There was slight improvement under treatment. The diagnosis was poliomyelitis acuta anterior lumbalis.

The author considers the diagnoses in these cases to be certain, as the illness ran a typical course. It is not extraordinary, in view of the findings in the epidemics of recent years, to find that the involvement was not always limited to the grey anterior projection of the spine, but included the brain, affected sensibility in the form of pain, and disturbed the function of the large intestine and bladder. After the acute symptoms had passed the clinical picture was in all cases typical of disease of the anterior projection. There was no indication of lues in any case.

The author has not observed endemic or infantile polimyelitis in the Ukraine, but the simultaneous high mortality of chickens in the vicinity is of interest in this connection. The etiological connection between these cases and the grip epidemic occurring at about the same time, is not certain.

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Stone, W. B.
Vander, Bogart F.
Stapleton, S. I.
Foster, Albert D.
Syracuse
Gould, L. A.
Larkin, Albert E.
Levy, Harris I.
Loveland, B. C.
Watkins
Ferris, A. W.

NORTH CAROLINA

Charlotte
Munroe, John P.
Hoke County
McBrayer, L. B.

NORTH DAKOTA

Bismarck
Arnson, Julius O.
Ruediger, Ernest W.
Mandan
Altnow, H. O.

OHIO

Cincinnati
Bettman, Henry Wald
Cleveland
Cummer, C. L.
Phillips, John
Stone, Charles W.
Stoner, C. Willard
Springfield
Syman, Louis L.
Toledo
Brown, N. Worth
Levinson, Louis
Salzman, Samuel R.
Tenney, C. F.
Zbinden, Theodore
Youngstown
Morrison, Robert M.
Patrick, Harry E.

OKLAHOMA

Norman
Ellison, Gayfree
Oklahoma City
Andrews, Leila E.
Chase, A. B.
Fishman, C. J.
Moorman, L. J.
Riely, Leander A.
White, Arthur W.

OREGON

Portland
Baar, Gustav
Koehler, George F.
Matson, Ralph C.
Selling, Lawrence

PENNSYLVANIA

Germantown
Kelley, Thomas C.
Johnstown
Stewart, H. M.

PENNSYLVANIA—*Continued*

Philadelphia

Allyn, Herman B.
Bernstein, Ralph
Beardsley, Edward J. G.
Gordon, Alfred
Mills, H. B.
Musser, John H., Jr.
Rehfuss, Martin E.
Robertson, William E.
Roussell, Albert E.
Sajous, Chas. E. deM.
Stewart, F. E.

Pittsburgh

Barach, Joseph H.
Billings, F. T.
Breisacher, Leo
Gardner, E. R.
George, S.
Grayson, Thomas Wray
Grier, George
Haythorn, Samuel
Hollander, Lester
Johnston, George C.
Johnston, J. I.
Jones, Clement R.
Lichty, John A.
McCreedy, E. Bosworth
McKelvey, James P.
Mercur, Wm. H.
Ohail, Joseph C.
Schwartz, Lorraine L.
Thorne, John Mairs
Utley, F. B.
Wolff, Jacob

York

Comroe, Julius H.
Holzapple, C. E.

RHODE ISLAND

Providence

Farnell, Fred J.

TENNESSEE

Memphis

Krauss, William
Leroy, Louis
McElroy, J. B.
Warr, Otis

TEXAS

Houston

Agnew, James H.
Waples, F. A.

UTAH

Salt Lake City

Gibson, C. Cattett
Richards, G. G.

VERMONT

Burlington

Beecher, Clarence Henry

VIRGINIA

Charlottesville

Davis, John S.

Richmond

Brown, Alex G.
Gray, Alfred L.
Hodges, J. Allison
Hutcheson, J. M.
McGuire, Edward
Shepard, William A.
Tucker, Beverley R.
VanderHoof, Douglas

WASHINGTON

Seattle

Blackford, J. M.
Heussy, William C.
Stith, Robert M.

Tacoma

Brown, J. R.
Wilson, C. Stewart

WEST VIRGINIA

Clarksburg

Cherry, Solomon

Huntington

Vest, Walter E.

WISCONSIN

Fond du Lac

Calvy, P. J.
Layton, Oliver M.

Milwaukee

Henes, Edwin, Jr.
Jermain, Louis
McJunkin, Frank A.

Milwaukee—Continued
Patek, Arthur J.
Warfield, Louis M.

CANADA

Brandon, Manitoba
Carter, L. J.
London, Ontario
Crane, James W.
Ferguson, J. I.
Fischer, S. M.
Hale, George C.
Hughes, F. W.
Lindsay, John C.
MacGregor, John
Montreal, Quebec
Benoit, Em. P.

CANADA—*Continued*

Toronto
Elliott, J. H.
Loudon, J. D.
Winnipeg, Manitoba
Burridge, A. J.
Cadham, F. T.
Chestnut, William
Hunter, Charles
Mackey, Hugh
McMillan, J. Currie
Montgomery, E. W.
Moody, A. W.
Murdoff, H. M.
Rogers, William
Young, Fred A.

ROSTER OF MEMBERS OF THE AMERICAN CONGRESS ON INTERNAL MEDICINE TO NOVEMBER, 1920

Alabama

Mobile

Roe, Lee Wright

Arizona

Globe

Kirmse, Alvin

Arkansas

Hot Springs

Deaderick, Wm. H.
Eckel, Geo. Mitchell
Thompson, Lloyd

Little Rock

Bathhurst, Wm. R.

California

Burbank

Rossiter, Frederick

Colfax

Peers, Robert

Glendale

Harrower, Henry
Keller, P. M.

Los Angeles

Barrow, John V.
Brooks, Herbert Thomas
Browning, Charles C.
Byrnes, Ralph
Campbell, Ralph R.
Crispin, Edgerton L.
Crum, Robert
Cummings, Rolland
Fishbaugh, E. C.
Frick, Donald
Granger, Arthur S.
Hart, Lasher
Hunter, George G.
King, Jos. M.
Lissner, Henry H.
Moore, Ross
Newton, E. Avery
Orbison, Thomas J.
Piness, George

Los Angeles—Continued

Scott, Alfred James, Jr.
Soiland, Albert
Taylor, F. W. Howard
Wessels, Walter
Visscher, L. G.

Monrovia

Pottenger, Francis M.

Oakland

Rowe, Albert H.
Strietman, Wm. H.

Pasadena

Breed, Lorena M.
Condit, Joseph
Luckie, James
Mackerras, R. H.
Mixsell, Raymond
Newcomb, Arthur T.
Stone, Willard J.
Wilson, J. M.

Redlands

Folkins, Frank H.

Riverside

Simonds, Paul E.

Sacramento

Gundrum, F. F.
Snyder, J. R.

San Diego

Churchill, James F.
Nielsen, John C. E.
Pickard, Rawson
Pollock, Robert
Yates, John C.

San Francisco

Lux, Frederick W.
Spier, Harry
Voorsanger, Wm. C.

San Leandro

Miller, Charles Howard

Colorado

Boulder

Gilbert, Oscar Monroe

COLORADO—*Continued*

Denver

Amesse, J. W.
Arndt, Rudolph W.
Arneill, James Rae
Bonney, Sherman G.
Burnett, C. T.
Hall, Josiah N.
Love, Tracy
Neuhaus, G. E.
Waring, James J.

CONNECTICUT

Bridgeport

Lynch, John C.

Hartford

Altshul, H.
Witter, Orin R.

New Haven

Gompertz, Louis M.
Levy, Louis Henry

DISTRICT OF COLUMBIA

Washington

Barnes, Noble P.
Conklin, C. B.
Grayson, Cary T.
Heller, Joseph M.
Lee, Thomas S.
Mallory, Wm. J.
Morgan, Wm. G.
Reed, Edward H.
Roy, Philip S.
Verbrycke, J. Russel

FLORIDA

Jacksonville

Love, James
McGinnis, R. H.

Miami

Benton, G. H.

GEORGIA

Atlanta

Bunce, Allen H.
Lawrence, Charles Ed.
Paine, C. H.
Strickler, C. W.

GEORGIA—*Continued*

Augusta

Mulherin, W. A.
Murphy, Eugene E.
Roberts, Stuart R.

LeGrange

Huck, J. Gardiner

Macon

Spencer, Jacob John

ILLINOIS

Chicago

Anderson, James L.
Babcock, Robert H.
Berghoff, Robert S.
Black, Robert Alfred
Blackwood, A. L.
Block, Leon
Cramp, Arthur J.
Cross, Edwin
Fantus, Bernard
Favill, John
Ferguson, Clara
Frick, Anders
Frinch, Robert L.
Futterer, Gus A.
Goldberg, Benjamin
Goldsmith, A. A.
Graves, Nathaniel A.
Gray, Ethan A.
Gray, Herbert W.
Grubbe, Emil
Gruskin, B.
Heintz, Edward L.
Hickenlooper, C. B.
Hoyne, Archibald L.
Hubeny, Maximilian John
Jacques, John L.
Karshner, Clyde F.
Kaufmann, Gustav
Krafft, Jacob C.
Leonard, Edward F.
Lewison, M.
Martin, Albert
Meling, Nelson C.
Metcalf, Walter B.
Moyer, Harold
Norden, H. A.
Orndoff, Benjamin
Patton, Joseph M.

Chicago—Continued
Pietrowicz, S. R.
Portis, Milton M.
Post, Geo. W.
Quinn, Wm.
Roach, Richard A.
Sempill, Robert A.
Seufert, E. C.
Sheets, Vaughn L.
Slaymaker, S. R.
Smithies, Frank
Stearns, Wm. G.
Tice, Frederick
Torpey, James F.
Trostler, I. S.
Weatherson, John
Withers, G. H.
Cicero
Barnes, James
Danville
McCaughey, Robert S.
Elgin
Gabby, S. L.
Hinton, Ralph
Decautur
Jack, Cecil
Evanston
Hastings, W.
Hoopeston
Jones, Leroy
Joliet
Werner, Frederick Wm.
Moline
Beam, Hugh A.
Peoria
Brown, D. A.
Cutler, Wm. W.
Meixner, Fred M. F.
Parker, George
Vonachen, J. R.
Rockford
Anthony, R. E.
Mosley, H. P.
Weld, Anna
Springfield
Herudon, Richard F.
Norbury, Frank Parsons
Trapp, Albert R.
Winnetka
Blatchford, F. W.

INDIANA

Fort Wayne
McCaskey, George
Indianapolis
Ketchum, Jane M.
Kiser, E. F.
Lapenta, Vincent A.
Olsen, Alfred B.
Schweitzer, Ada
Wynn, Frank B.
LaFayette
Lairy, M. M.
South Bend
Cooper, A. L.
Sensenich, R. L.

IOWA

Centerville
Marker, John I.
Davenport
Decker, H. M.
Lamb, Fred G.
Des Moines
Bierring, Walter L.
Ryan, Granville N.
Strawn, J. T.
Throckmorton, Tom B.
Welpton, Hugh G.
Dubuque
Keogh, John V.
Fairfield
Gaumer, James Stewart
Keokuk
Fuller, Frank
Maquoketa
Bowen, A. B.
Mason City
Farrell, V. A.
Sioux City
Meis, E. W.
Shuman, John W.
Williams, Edw. M.
Webster City
Galloway, M. B.

KANSAS

Halstead
Baumgartner, E. A.
Herington
Reichley, Elmer J.

KANSAS—*Continued*

Lawrence
Nelson, C. F.

Milford
Brinkley, John R.

Wichita
Hoffman, J. Z.
Jager, T. J.

KENTUCKY

Lexington
Bradley, Ernest B.
McClymonds, Julian
Scott, John W.

Louisville
Barbour, Philip F.
Bate, R. Alex.
Bayless, B. W.
Dowden, C. W.
Finck, T. D.
Fleischaker, F. W.
Frazier, Ben Carlos
Graves, Stuart
Griswold, Alex. V.
Hays, George
Horine, Emmet F.
Jenkins, William A.
Keith, D. Y.
Kirk, J. Allen
Lucas, C. G.
Meyers, Sidney J.
Moore, John Walker
Moren, John J.
Morrison, J. R.
Nickell, A. W.
Solomon, Leon L.
Speidel, Fred G.
Thompson, Cuthbert
Tuley, Henry Enos
Young, W. J.

Newport
Anderson, W. W.

LOUISIANA

New Orleans
Bass, Charles
De Buys, L. R.
Lemann, Isaac Ivan
Lyons, Randolph H.

New Orleans—Continued
Tichenour, G. H., Jr.
Van Wart, Roy M.

MAINE

Portland
Burrage, Thomas J.
Gehring, E. W.

MARYLAND

Annapolis
Bloedorn, W. A.

Baltimore
Beck, Harvey G.
Hemmeter, John C.
Hirschmann, Isador I.
Leitz, Frederick
Miller, Syndey R.
O'Mara, John T.
Ruhrah, John
Shearer, Thos. L.
Zueblin, Ernest

Snow Hill
Riley, John L.

MASSACHUSETTS

Boston
Austin, A. E.
Bangs, Charles H.
Briggs, L. Vernon
Brown, Percy
Dana, Harold W.
Granger, Frank B.
Jelly, Arthur C.
McCrudden, Francis H.
Otis, Edward O.
Overlander, C. L.

Melrose
Ruble, Wells Allen
Smith, John Hall

Salem
Sargent, Ara N.

Springfield
Bacon, Theodore S.
Chapin, Lawrence D.

West Newton
Paine, N. Emmons

Worcester
Baff, Max
Bigelow, Edward B.

MICHIGAN

Ann Arbor

Cowie, David Murray
Gordon, Wm. Henry
Klingman, Theophil
Marshall, Mark
Parnell, C. G.
Warthin, Alfred Scott
Van Schoick, John

Battle Creek

Heald, C. W.
Mortensen, M. A.
Nelson, A. W.
Pitchard, J. S.
Roth, Paul
Stewart, Charles E.

Bay City

Baird, Fred S.
McLurg, John

Detroit

Aaron, Chares D.
Biddle, Andres Porter
Breisacher, Leo
Buesser, Frederick G.
Carlucci, P. F.
Carstens, Henry R.
Chester, John L.
Cleland, James, Jr.
Clippert, Frederick
Conner, Guy L.
Dempster, James H.
DeWitt, A. S.
Donald, William M.
Evans, W. A.
Haas, E. W.
Harrison, Beverly Drake
Harvey, John Goold
Hickey, Preston M.
Hitchcock, Chas. W.
Holmes, Arthur
Hoops, G. B.
Hoskins, Neal L.
Inglis, David
Ives, Augustus W.
Jennings, C. G.
Jennings, Alpheus F.
Kiefer, Guy L.
King, Dale M.
Lee, John
Lockwood, Bruce C.

Detroit—Continued

McClintic, C. F.
McGraw, Theo. A., Jr.
McKean, Geo. E.
McNaughton, Geo. P.
Meloy, Carl R.
Mooney, Edward W.
Polozker, I. L.
Rich, Herbert M.
Schmidt, Harry B.
Sherman, G. H.
Sichler, E. H.
Stapleton, Wm. J.
Starkey, Frank R.
Stephenson, Frank
Stevens, Rollin
Stiles, C. H.
Ulrich, Henry L.
Van Rhee, George
Varney, H. R.
Vreeland, C. Emerson
Watkins, John T.
Wendt, Leonard F. C.
Wilson, Walter J.

Flint

Burr, C. B.
Clift, M. Wm.
Knapp, M. S.
Marshall, William H.
Morrish, Ray S.

Grand Rapids

Baker, Abel J.
Corbus, Burton R.
Gordon, T. D.
Irwin, Thomas C.
Johnston, Collins H.
Meengs, J. B.
Moore, Vernon
Northrup, Wm.
Wells, M.

Granville

Brook, J. D.

Hancock

Fischer, Arthur F.

Kalamazoo

Bliss, Guy L.
Crane, A. W.
Jackson, John B.

MICHIGAN—*Continued*

Lansing
Holm, M. L.
Olin, Richard M.
Papeer
Kay, W. J.
Monroe
Southworth, Chas.
Munising
Trueman, G. A.

MINNESOTA

Duluth
Linneman, N. L.
Martin, T. R.
Rowe, Olin W.
Scherer, C. A.
Tuohy, E. L.
Minneapolis
Avery, J. Fowler
Beard, Archie
Crafts, Leo M.
Drake, Charles
Gardner, Edward L.
Head, George Douglas
Henry, Clifford E.
Morrison, A. W.
Peppard, Thomas Albert
Rizer, Robert I.
Robertson, H. E.
Schlutz, Frederick W.
Schneider, John P.
Ulrich, Henry L.
Rochester
Hartman, Howard R.
MacCarthy, Wm. C.
St. Paul
Burns, Robert M.
Gager, Edward C.
Greene, Charles Lyman
Hall, Alexander
Hoff, Peder A.
Lepak, John A.

MISSOURI

Columbia
Stine, Dan G.
Kansas City
Bohan, P. T.
Duke, Wm. W.

Kansas City—Continued
Fassett, Charles W.
Hamilton, Hugh D.
Holbrook, Ralph
Hoxie, George H.
Lynch, L. A.
McPherson, Owen P.
Milne, Lindsay S.
Murphy, Franklin E.
Myers, Wilson A.
Wolfe, I. J.
St. Joseph
Bell, John M.
St. Louis
Baumgarten, Walter
Brady, Jules M.
Butler, L. P.
Clemens, J. R.
Engelbach, William
Falk, O. P. J.
Hughes, Marc Ray
Ives, George
Lyter, J. Curtis
MacFadden, James F.
Neilson, Charles Hugh
Smith, Elsworth
Zahorsky, John

MONTANA

Helena
Fligman, Louis L.
Livingston
Pampel, B. L.
Miles City
Brown, George E.

NEBRASKA

Lincoln
Mayhew, John Mills
Smith, Arthur L.
Norfolk
Barry, Augustus C.
Foster, Robert A.
Pollack, Fredolph
Omaha
Ballard, C. H.
Bliss, Rodney W.
Christie, B. W.
Clarke, Floyd
Coulter, F. E.

Omaha—Continued
Crummer, Leroy
Dunn, A. D.
McClanahan, H. M.
Milroy, Wm. F.
Riley, Bryan
Sachs, Adolph
Tyler, Albert F.

NEW JERSEY

Atlantic City
Alsop, Thomas
Jonah, William E.
Stewart, W. Blair

Elizabeth
Stern, Arthur

Glen Ridge
Wallace, Henry

Greystone Park
Donnet, John Victor
Fisher, Ernest M.
Henschel, Louis K.
Thorne, Frederick H.

Hackensack
McFadden, G. Howard

Hoboken
Gelbach, Rudolph W.
Von Deeisten, Henry T.

Jersey City
Cassidy, John M.

Montclair
Mabey, John Corwin

Newark
Beling, C. C.
Bumsted, C. R.
Connolly, Richard
Dowd, Ambrose F.
Elliott, Daniel
Lowrey, James H.
Martland, Harrison
Steiner, Ed.
Teeter, Charles E.

Nutley
Whelan, Edward P.

Paterson
Surnamer, Isaac

Rockaway
Flagge, Frederick W.

NEW JERSEY—*Continued*

Secaucus
King, G. W.
Pollak, B. S.

Town of Union
Curtis, Grant P.

Trenton
McDonald, John O.

NEW YORK

Albany
Conway, F. C.
Cox, F. J.
Rooney, James F.

Auburn
Gerin, John

Bedford Hill
Stivelman, B.

Binghamton
Lape, George S.
Lappeus, John C. S.
Overton, W. S.

Brooklyn
Andersen, A. F. R.
Aten, William H.
Banowitch, Morris M.
Bartley, E. H.
Betz, Isidore
Blatteis, Simon R.
Block, Siegfried
Brockway, Robert O.
Brown, Samuel S.
Brush, Arthur C.
Bunker, Henry A.
Butler, Glentworth R.
Chapin, Edward
Clarke, Raymond
Collins, John J.
Cornwall, E. E.
Coughlin, Robert E.
Cross, Frank Bethel
Cruikshank, Wm. J.
Dattelbaum, M. J.
DeLorme, M. F.
DeYoanna, A.
Dobkin, Nicholas
Eastmond, Charles
Evans, George A.
Fairbairn, Henry A.
Fisher, Charles M.

Brooklyn—Continued
Forbes, George
Gordon, Murray B.
Gutman, J.
Hangarter, Andrew H.
Hoxsie, Edward H.
Hubbard, W. S.
Ives, Robert F.
Joachim, Henry
Kandt, Hartwig
Kerr, LeGrand
Keyes, E. P.
Kingman, Robert
Klein, A.
Little, George F.
Louria, Leon
Ludlum, W. D.
Macumber, John L.
MacEvitt, James M.
Meagher, John F. W.
Moser, William
Moses, Henry Monroe
Nash, Philip I.
Northridge, Wm. A.
Parrish, Paul L.
Reque, P. A.
Smith, Archibald D.
Smith, Joseph E.
Somers, J. A.
Van Cott, J. M.
Wallace, Wesley H.
Warren, L. F.
Webster, Henry G.
Wheeler, Robert T.
Wolfer, Henry

Buffalo
Benedict, A. L.
Cohen, Bernard
Eckel, John L.
Gibson, Arthur R.
Jones, Allen A.
Kauffman, Lesser
Love, F. W.
Lytle, Albert T.
Patterson, Harold A.
Pryor, John H.
Rice, James Francis
Rochester, DeLancey
Russell, Nelson G.

Buffalo—Continued
Thoma, Fridolin
Ullman, Julius
Walsh, Thomas J.

Central Islip
Burns, Geoffrey Chas. H.
Reed, Ralph G.
Vaux, Chas. L.

Clifton Springs
Woodbury, Malcolm
Wright, Floyd
Winter, Henry Lyle

Elmhurst
Schweigart, Fred J.

Forest Hills
Chalmers, Thomas C.

Mt. McGregor
Houk, Horace John

Mt. Kisco
Curry, G. P. M.

New York City
Amster, J. Lewis
Baketel, H. Sheridan
Bassler, Anthony
Berg, Henry W.
Bieber, Joseph
Bishop, Ernest S.
Bishop, James
Bishop, Louis F.
Blumgarten, A. S.
Bovaird, David
Brooks, Harlow
Burr, Chauncey L.
Byrne, Joseph H.
Byrne, Joseph
Caille, Augustus
Carman, Albro R.
Coleman, Daniel S.
Cooke, Robert A.
Davis, E. Elbert
Diner, Jacob
Donovan, Daniel J.
Egan, Cornelius J.
Edson, David Orr
Eichler, Philip
Field, C. Evertt
Fisch, Gustav Grant
Friedman, G. A.
Goodhart, S. Philip
Goodridge, Malcolm

New York City—Continued
Gottlieb, Charles
Greeff, J. G. Wm.
Grossman, Morris
Halpern, J.
Hatch, Leffingwell
Herrick, W. W.
Herrman, Charles
Hirsch, Isaac
Holland, Arthur L.
Hollis, A. Wm.
Hollister, Frank C.
Horowitz, Philip
Hunt, Edward L.
James, Walter B.
Jutte, Max Ernest
Katzenback, W. H.
Kraus, Walter Max
Laport, George L.
Levy, I. J.
LeWald, Leon T.
Lewi, Emily
Lewis, H. Edwin
Lieb, Clarence W.
McKendree, Chas. A.
McSweeney, E. S.
Maier, Otto
Mannheimer, George
Meltzer, Victor
Meuer, S. H.
Meyer, Alfred
Monae-Lesser, Mozart
Mooney, Louis M.
Nagle, James F.
Norman, M. Philip
Pease, Marshall C.
Pfeiffer, Felix
Philip, Carlin
Pumyea, P. C.
Quackenbos, H. F.
Quintard, Edward
Raminez, Max A.
Reilly, Thomas F.
Richardson, E. J.
Robinson, D.
Rothenberg, L. H.
Rottenberg, I. M.
Sachs, L. B.
Satterthwaite, Thos.
Schapira, S. Wm.

New York City—Continued
Schlapp, Max G.
Scott, George D.
Shelby, E. P.
Sheldon, Wm. H.
Sillo, Valdemar
Stark, M.
Stella, Antonio
Stewart, Wm. H.
Strodl, George T.
Sturtevant, Mills
Thom, Burton Peter
Titus, Edward C.
Turck, Fenton B.
Wachsmann, S.
Weber, Leonard G.
Weinstein, Julius W.
Weiss, Samuel
Welker, Franklin
Wilcox, R. W.
Wilson, George A.
Youngling, George S.

Niagara Falls
McBlaine, Thomas J.

Ogdensburg
Cooper, W. Grant

Ponghkeepsie
Hill, Eben C.
Von Tiling, Johannes

Rochester
Button, Lucius L.
Darrow, Charles E.
Ewers, Wm. V.
Jackson, Edward W.
Lath, E. M.
Mulligan, Wesley T.
Sutter, C. Clyde
Swan, John M.
Williams, J. R.

Schenectady
Betts, Lester
Collie, Roy M.
Faust, Louis
Goddard, Walter W.
Ham, Stillman S.
Reed, Fred C.
Scott, J. M. W.
Stone, Warren B.
Vander, Bogart Frank

NEW YORK—*Continued*

Syracuse
Gould, L. A.
Kaufman, Franklin J.
Larkin, Albert E.
Levy, I. Harris
Loveland, B. C.
Reifenstein, Edw. C.
Wiseman, Joseph R.

Stapleton
Foster, Albert D.

Troy
Stillman, Edgar R.

Utica
Dill, George H.

Watkins
Ferris, Albert W.

NORTH CAROLINA

Charlotte
Munroe, John P.
Nisbit, Walter O.

Hoke County
McBrayer, L. B.

High Point
Hiatt, Houston B.

Raleigh
Anderson, Albert

NORTH DAKOTA

Bismarck
Arnson, Julius O.
Ruediger, Ernest Henry

Mandan
Altnow, H. O.

OHIO

Akron
Held, Charles E.

Cincinnati
Bettman, Henry Wald
Greiwe, John E.
Stix, Walter H.
Wendel, Henry C.

Columbus
Sheetz, John W.
Whitaker, H. W.

Cleveland
Berger, Samuel S.
Cummer, C. L.

Cleveland—Continued
Fliedner, G. B.
Philips, John
Stone, Charles W.
Stoner, Willard C.
Updegraff, Ralph K.

Marion
Young, Fillmore

Richwood
Roebuck, L. L.

Springfield
Syman, Louis L.

Steubenville
Bradley, John A.
Miller, J. E.

Toledo
Brown, N. Worth
Levisson, Louis A.
Salzman, Samuel
Tenney, C. F.
Waggoner, C. W.
Zbinden, Theodore

Warren
Manley, O. T.

Youngstown
Jones, E. Henry
Morrison, R. M.
Patrick, H. E.
Rosenblum, Alex. M.
Welch, H. E.

OKLAHOMA

Chickasha
Leeds, Alexander B.

Norman
Ellison, Gayfree

Oklahoma City
Andrews, Leila E.
Chase, A. B.
Fishman, C. J.
Moorman, L. J.
Riely, Leander A.
White, Arthur W.

OREGON

Portland
Baar, Gustav
Brill, I. C.

Portland—Continued
Koehler, George F.
Matson, Ralph C.
Selling, Lawrence

PENNSYLVANIA

Allentown
Beck, Foster A.
Ashland
Biddle, Robert
Chester
Wood, John Wm.
Clerk's Summit
Imhoff, Wm. H. M.
Corry
Christie, A. C.
Donora
Lewis, Wm. H.
Germantown
Kelly, T. C.
Johnstown
Stewart, H. M.
Norristown
Christian, T. B.
Oil City
McLain, Paul J.
Philadelphia
Allyn, Herman
Anders, James
Beardsley, Ed.
Bernstein, Ralph
Daland, Judson
Dercum, F. X.
Dickinson, H. S.
Gordon, Alfred
Loewenburg, S. A.
Mills, H. B.
Musser, John H. J.
Oliensis, A. E.
Reeves, Rufus S.
Rehfuss, M. E.
Robertson, Wm. E.
Roussel, Albert
Sajous, Charles E. deM.
Smith, Ernest B.
Stewart, F. E.
Warmuth, M. P.
Pittsburgh
Alexander, J. Hope
Barach, Jos. H.

Pittsburg—Continued
Berg, G. F.
Billings, F. T.
Gardner, E. R.
George, S.
Grayson, Thomas W.
Grier, George W.
Haythorn, Sam
Hollander, Lester
Hood, Robert T.
Johnston, G. C.
Johnston, J. I.
Jones, Clement R.
Lichty, John A.
Litchfield, L.
Mayer, Ed. E.
Mayer, W. H.
McCready, E. B.
McKelvey, J. P.
Mercur, Wm. H.
Ohail, J. C.
Palmer, G. A.
Pettit, Albert
Schwartz, L. L.
Sherrill, A. W.
Shilen, J.
Simonton, T. A.
Thorne, J. M.
Utley, F. B.
Westervelt, H. C.
Wolf, Jacob
Zeedick, Peter I.
Zugsmith, Edwin

Reading
Bertolet, Wm. S.
Republic
Kimmel, W. S.
South Bethlehem
Butler, Thomas
Uniontown
Smith, Charles H.
Vandergrift
Speer, Ross H.
Washington
Sargent, L. D.
Wilkes-Barre
Collins, Daniel W.
Kaufman, Albert

PENNSYLVANIA—*Continued*

York
Comroe, Julius H.
Holtzapple, G. E.

RHODE ISLAND

Providence
Farnell, Frederick J.

SOUTH CAROLINA

Florence
Barnwell, John M.

SOUTH DAKOTA

Java
Rosenthal, Sigmond

TENNESSEE

Knoxville
Bowen, William
Memphis
Bosworth, Robinson
Cullings, Jesse J.
Fontaine, Bryce W.
Krauss, Wm.
Jones, Frank A.
Leroy, Louis
McElroy, J. B.
Rudner, Henry G.
Swink, Walter T.
Warr, Otis
Nashville
Dunklin, F. B.
Witherspoon, John A.

TEXAS

Dallas
Calvert, W. J.
Galveston
Chapman, L. E.
Graves, M. L.
Levy, Moise D.
Stone, C. S.
Houston
Agnew, James H.
Einsand, Victor
Waples, F. A.
Temple
Gober, O. F.

TEXAS—*Continued*

Waco
Colgin, M. W.

UTAH

Salt Lake City
Cochran, Geo. A.
Gibson, Catlett T.
Rich, Wm. L.
Richards, G. G.
Silver, Edw. V.

VERMONT

Battleborough
Lane, Wilfred H.
Burlington
Beecher, Clarence Henry

VIRGINIA

Charlottesville
Davis, John Staige
Norfolk
Grandy, Charles R.
Silvester, Willis Wilson
Richmond
Gray, Alfred L.
Hodges, Fred M.
Hodges, J. Allison
Houser, A. A.
Hutcheson, J. M.
McGuire, Edward
Shipard, Wm. A.
Tucker, Beverly R.
VanderHoof, Douglas

WASHINGTON

Seattle
Blackford, J. M.
Heussy, William C.
Stith, Robert M.
Tacoma
Brown, J. R.
Wilson, C. Stuart

WEST VIRGINIA

Clarksburg
Cherry, Solomon
Shuttleworth, B. F.
Huntington
Vest, Walter E.

WISCONSIN

Barron
Post, C. C.
Fond du Lac
Calvy, P. J.
Layton, Oliver M.
Madison
Blankinship, Ray C.
Carter, Homer M.
Fahr, Geo. Elveston
Marshfield
Milbee, H. H.
Turgasen, F. E.
Milwaukee
Henes, Edwin
Jermain, Louis
McJunkin, Frank A.
Patek, Arthur J.
Warfield, Louis M.
Oshkosh
Andrews, Neil
Werner, O. E.

WYOMING

Evanston
Thompson, A. P.

CANADA

Brandon, Man.
Carter, L. J.
Fredericton, N. B.
Van Wart, George Clowes

CANADA—*Continued*

London, Ont.
Crane, James W.
Ferguson, J. I.
Fischner, S. M.
Hale, George C.
Hughes, F.
Lindsay, John C.
MacGregor, John A.
Montreal, Quebec
Benoit, Em. P.
Shedden, Ontario
Aitkin, G. W. A.
Toronto, Ontario
Elliott, J. H.
Loudon, J. D.
McPhedran, J. H.
Minns, F.
Winnipeg, Man.
Burridge, A. J.
Chestnut, William
Cadham, F. T.
Gilmour, C. R.
Hunter, Charles
Mathers, Alvin T.
Mackay, Hugh
McMillan, J. Currie
Montgomery, E. W.
Moody, Arthur W.
Murdoff, H. M.
Rogers, William
Young, Fred A.

SYPHILIS OF THE LUNG

AN ANALYSIS OF 120 SELECTED CASES FROM THE LITERATURE

BY ROLLA G. KARSHNER, B.S., M.D.

Sometime Fellow in Dermatology and Syphilology, University of Michigan, Ann Arbor,

Los Angeles

and

CLYDE F. KARSHNER, A.B., M.D., F.A.C.P.,

Instructor in Medicine in the College of Medicine, University of Illinois,

Chicago.

IN reviewing a series of our cases of pulmonary disease which were undoubtedly due to syphilitic infection, we have become impressed with the chaotic condition of the literature upon the subject. Consequently before publication of our own cases we have felt that the time is ripe for an attempt to organize and unify the vast amount of data already published.

While the existence of syphilitic pneumopathy is denied by some and affirmed by others, we believe that it occurs more frequently than it is recognized. In attacking the lung, syphilis assumes its rôle as the "great imitator," and we find it simulating every possible pneumopathy, and inasmuch as it is easily curable, it behooves clinicians to recognize and properly treat it.

In selecting our 120 cases from the literature for analysis we have taken only those cases in which evidence of syphilitic etiology was convincing. Naturally we have accepted less than 1 case in every 10 reported. No doubt we have excluded many cases which were uncomplicated lung syphilis, but the evidence in the reports is either incomplete or not conclusive. Of the 120 cases, we believe that 86 were cases of syphilis of the lung, beyond the slightest shadow of a doubt of tuberculous or other complication. Of all the proofs offered in favor of uncomplicated syphilitic infection of the lung, the therapeutic test has been the most potent, though no case has been included in the series on this test alone, and cure upon specific treatment has not been considered necessary in every case. In general we have decided upon the balance of the evidence and the absence of all known indications of tuberculous or other infection.

History.—For the history of lung syphilis, the reader is referred to the monograph of Beriel, the chapter by Milian in Fournier's *Traite de la Syphilis,* or the thesis of Massia. Only the merest outline is attempted here.

Previous to the time of Laennec, the notions of syphilis of the lung were vague. Pare, Astruc and Morgagni spoke of *phtisie a lue venerea,* and for a time all phthisis was believed to be syphilitic. In the beginning of the ninteenth century (1810), Beyle spoke of pulmonary syphilis from an anatomical standpoint. Then Laennec established the anatomical entity of tuberculosis and belief in syphilis of the lung was almost completely overthrown. Later Lagneau, Yvaren, MacCarthy (1844), and Ricord vainly attempted to draw attention to syphilitic pneumopathies. For years its existence was suspected, and, for the most part, absolutely denied. Toward the middle of the ninteenth century, anatomical pathology aided the development of the subject and the real history of pulmonary syphilis had its birth. Depaul, Widal, Dittrich, Virchow, and others described white pneumonia of the new-born.

In France, Cornil and Ranvier described gummata. During the period from 1864 to 1866 Lancereaux recorded clinical observations which were very precise, and his works mark an important step in advance.

Then came a flood of works, anatomical as well as clinical: Landrieux, 1872; Fournier, 1875; Pawlinoff, (*anat.*) 1879; Schnitzler, 1879; Cube, 1880; Gamberini, (*Giorn. ital. delle mal. ven.*, 1880); Pancritius, 1881; These de Carlier, 1882; Sokolowski, 1883; These de Jacquin, 1884; Hiller, 1884; Mauriac, 1888; Potain, 1888; Dieulafoy, 1889; Councilman, 1891; Rolleston, 1891; and many others.

More recently the important works are those of Zinn, 1898; Flockemann, 1899; Stengel, 1904; Milian, 1906; Kokawa, 1906; Herxheimer, 1906; Beriel, 1908; Brandenburg, 1908; Sugai, 1909; Shingu, 1910; Massia, 1911; Landis and Lewis, 1915; Carrera, 1920. In contrast to the publications of the preceding decade, most of the latter have been anatomical studies.

Incidence.—Very little satisfactory data regarding the frequency of syphilis of the lung is as yet available. Believed to be common by some, it is regarded as the rarest accident by others. In 1905 Claytor stated that out of 13,000 specimens at the Army Medical Museum in Washington there was not a single example of pulmonary syphilis. In 1895 ten cases were so labeled in the pathological collections of London. Upon careful scrutiny these are unconvincing cases. In 6,000 Chicago autopsies, Backok reports 2 cases showing syphilitic lesions in the lungs. In Vienna Kolisko saw 100 cases of lung syphilis in thousands of autopsies. Syphilis of the lungs is reported as extremely rare in 4270 autopsies at the Pathological Institute in Buenos Aires. Stanley (*Brit. Med. Journ.*, 1911, i, 181,) records 2 cases of syphilitic pulmonary lesions and 1 doubtful case among 1,000 cases of pulmonary disease. In 6,000 autopsies in the Copenhagen Hospital, only 2 cases of syphilis of the lung are recorded. In 97 autopsies, Chiari found 1 case. In 88 autopsies, Peterson noted 11 cases. In 2,995 autopsies in Breslau, Stolper found syphilitic lesions in 86 cadavers, in 61 of which the lesions were due to acquired syphilis. Of these 61 cases, 5 had pulmonary syphilis, 4 showing fibroid changes, 1 a gumma. Osler saw 12 cases in 280 autopsies on syphilitics at Johns Hopkins Hospital. Neumann says that syphilitic lesions of the lung are rare as compared with manifestations of the disease in other organs. However, in 1918 Rössle stated that syphilis of the lung was at least as frequent as syphilis of the liver. Recently, in the Jefferson Chest Hospital, 1200 supposedly tuberculous patients were carefully examined for mistaken diagnosis. Seventy-two cases, or 6 per cent were proven non-tuberculous, 4 cases of which were pulmonary syphilis. In a careful microscopical study of the lungs of 152 known syphilitics, Carrera found syphilitic lesions in 8 per cent, one-fourth being cases of gumma.

It is reasonable to believe that the condition is often met with clinically and not recognized. This is particularly true of syphilis of the lung in association with pulmonary tuberculoss, which is the commonest form of syphilitic involvement of the lungs. According to Roque, 4 or 5 cases of syphilis of the lung are encountered annually in his service. The patients come in as phthisical; no bacilli can be found in the sputum, and the seroreactions are negative for tuberculosis. Inoculations of sputum into guinea pigs are without accident. Such cases yield readily to specific treatment. Paviot states that cases of syphilis of the lung are often fruitlessly treated as pulmonary tuberculosis, and subsequently come to his autopsy table. Such are the common experiences of many other of the French clinics in which more than ordinary vigilance is employed to intercept cases of syphilitic phthisis. From an extensive survey of the literature and from our clinical experience, we feel that cases of syphilis of the lung are quite common, and, if recognized, often give rise to therapeutic surprises. In the past such clinical recognition seems to have largely depended upon what Dieulafoy terms the power of intuition of the practitioner.

Age.—The age of the patient was stated in 98 of the cases. The oldest recorded age was seventy; the youngest was two. The average of all the ages was thirty-six. The disease is commonest in the early thirties. The average age of the patients who came to autopsy was considerably higher than the average age of those with cure, as many of the cases run a chronic course.

Sex.—The sex was noted in 118 cases. The condition is more common in males than in females, the ratio being about 2 to1. Seventy-six of this series were males; there were 31 deaths. Forty-two were females; 21 deaths. Therefore, the condition seems to be more fatal in women.

Date of Infection.—The time elapsing between the appearance of the initial sore and the manifestation of the lung symptoms was ascertained in 49 of the acquired cases. The 2 earliest cases occurred three months *post infectionem*. The latest case came to autopsy thirty-four years after the chancre. The average period between the primary sore and the lung accident was eleven years. Four cases occurred less than a year after the initial lesion. Case II, occurring at three months, resembled lobar pneumonia. Case LII, occurring at three months, was a case of incipient phthisis. Case XXXV, occurring six months after infection, was phthisis. Case I, occurring at ten months, resembled acute tuberculous pneumonia. Case CXI, showed at autopsy thirty-four years after infection, bronchiectasis, fibrosis, active syphilitic pneumonia, and caseous masses. Twenty of the series were reported as "old syphilities." Most of the above were cases with autopsy, and were probably encountered more than 11 years *post infectionem*. It would seem, therefore, that syphilitic involvement of the lung as recognized up to the present time, is among the latest manifestations of the disease. This is substantiated by the fact that a large number of the cases had had previous late cutaneous and osseous lesions. With more strict clinical vigilance and modern aids to diagnosis the average period between infection and discovery of lung accidents should be greatly shortened.

Twelve of the cases were heredosyphilis with no deaths. The age was stated in 10. The youngest was two, the oldest forty. One was reported as "adult." The average age for 10 cases was fourteen. Cases of white pneumonia in the new-born were not included in the series.

Nature and Course.—The 120 cases may be grouped as follows:

TABLE I

Cases cured	56
Cases improved on treatment	5
Cases showing no improvement on treatment	1
Cases with death in spite of treatment	4
Total number of cases treated	66
Cases with death and autopsy (treated)	4
Cases with death and autopsy (untreated)	51
Total number of cases with death and autopsy	55
Cases refusing treatment	3

Associated Syphilitic Lesions.—In the following table we have not considered the stigmata of hereditary syphilis. Of the 12 cases of such, all were markedly stigmatized. Of the 120 cases, 95, or 80 per cent showed concurrent or previously active syphilitic lesions which were recognized clinically. Of these, 48 had multiple lesions, involving more than one system. The distribution and nature of the associated lesions is tabulated as shown in Tables II, III, and IV.

It will be seen from Table II that 32, or 27 per cent of the cases showed clinically recognizable bone lesions. In 30 cases, or 25 per cent, there were cutaneous syphilids. Eleven per cent of the cases showed laryngeal involvement; 5 per cent tracheal stenosis. In 14 cases, or 12 per cent of the total

TABLE II

Skin	30 cases
Multiple	10
Gummata	12
Ulcers and Gummatous Ulcers	12
Late Eruptions	10
Cicatrices	4
Bones	32 cases
Multiple	6
Joints	5
Bone Pains	4
In the large majority of cases of bone involvement, the lesions were gummata, exostoses, and osteoperiostitis. The commonest sites of the gummata were the sternum, clavicle, ribs, tibiæ, nasal septum and maxilla. There were 2 cases of cranial gummata, and one of the orbit.	
Muscles	6 cases
Gummata	3
Pain	3
Adenitis	12 cases
Mucus membranes	5 cases
Ulcer of tonsil	2
Mouth and labial ulcer	2
Leukoplakia	1
Tongue	6 cases
Gummata	3
Ulcers	2
Scars	1
Pharynx, ulcers	2 cases
Palate	6 cases
Gummata	3
Ulcer, perforation or cicatrices	3
In 3 cases the lesions were limited to the soft palate.	
Larynx	13 cases
Syphilitic laryngitis	8
Ulcerative laryngitis	5
Tracheal stenosis	5 cases
Tracheotomy performed	2
Nervous system	17 cases
Hemiplegia	6
Headache	3
Gumma of brain	3
Cases showing slight involvement on neurological examination	4
Cerebral symptoms	2
Jacksonian epilepsy	1
Tabes dorsalis	1
Liver	18 cases
Icterus	2
Collateral circulation, ascites	2
Deformed	1
Palpable	18
Spleen, palpable	4 cases
Testicles	8 cases
Heart and Kidneys	14 cases
Systolic murmur at apex, angina pectoris	1
Mitral insufficiency	1
Second aortic sound accentuated	2
Mitral and aortic stenosis, aortic insufficiency	1
Edema, aortic murmur, pus in urine	1
Acute nephritis	2

(Table II continued from page 374)

Chronic nephritis and aortitis	1
Anasarca	4
Uremia	1
Miscellaneous	6 cases
Gumma right culdesac	1
Syphiloma of eye	1
Syphilitic iritis	1
Fistula in ano	1
Anal abscess	1
Dilatation of aortic arch	1
Aneurysm of aorta	1

TABLE III

Four out of the 55 cases cured returned subsequently for treatment of syphilitic lesions as follows:

Syphilitic whitlow	1
Osteoperiostitis of frontal bone	1
Involvement of liver	1
Cutaneous gummata	1

The 55 acquired cases with autopsy showed pathology elsewhere than in the lungs, as follows:

TABLE IV

Amyloid	11 cases
Liver	1
Liver and kidney	2
Liver, spleen and kidney	1
Liver, spleen, kidney, intestine	1
Liver, spleen, kidney, intestine, adrenal	2
Kidney	1
Spleen	1
Spleen and kidney	2
Aorta	11 cases
Dilatation	3
Aneurysm	4
Atheromata	2
Mesaortitis	1
Syphilitic and ulcerous	1
Liver	23 cases
Gummata	7
Gummata and cicatrices	2
Cicatrices	1
Syphilitic	7
Sclerogummatous	3
Interstitial hepatitis	1
Perihepatitis	1
Gummata, cicatrices, perihepatitis	1
Spleen	13 cases
Perisplenitis	4
Gummata	3
Enlarged	3
Syphilitic	1
Fibrosis	1
Calcareous masses	1
Kidneys	10 cases

(Table IV continued from page 375)

Chronic interstitial nephritis	6
Gummata	2
Sclerous	2
Testicles	5 cases
Palate	2 cases
Pharynx	3 cases
Larynx	2 cases
Tracheal stenosis	3 cases
Bronchial stenosis	4 cases
Heart	2 cases
Aortic insufficiency	1
Aortic, mitral and tricuspid insufficiency	1
Constitutional syphilis	1 case
Gumma of thyroid	1 case
Gumma of bronchial glands	1 case
Gumma of jugular glands	1 case
Gumma of diaphragm	4 cases
Gumma of stomach, intestines and mesenteric lymph-nodes	1 case
Gumma of bodies of vertebræ and ribs	1 case
Gummata of pancreas, omentum and bladder	1 case
Gummata of abdominal lymph glands	1 case
Miliary gummata of pancreas	1 case
Cicatrices of vulva, aneurysm of arteries at base of brain	1 case
Purulent peritonitis	1 case
Nervous system	3 cases
Pachymeningitis hemorrhagica interna	1
Scar in brain	1
Tumor of optic chiasm	1

number, there was heart or kidney involvement demonstrable previous to autopsy. The liver was palpated in 18, or 15 per cent of the cases. While 17 cases showed symptoms referable to the nervous system, it is interesting to note that with the exception of a single case occurring in a tabetic, there was no evidence of what we ordinarily consider nervous system syphilis, the symptoms in the other cases all being indicative of vascular changes, gummata or toxemia.

Analysis of the 55 cases with autopsy (Table IV) shows that there was amyloid change in 20 per cent of the cases. The aorta was syphilitic in 20 per cent of the cases, while the liver was attacked in 40 per cent of the series. Twenty-four per cent showed diseased spleen. In 18 per cent the kidneys presented lesions; the heart in 4 per cent. Sixteen per cent of the 31 males with autopsy showed evidence of syphilitic lesions in the testicles.

Causes.—Virulence of the infection, perhaps coupled with weakened individual resistance would seem to be the greatest predisposing factors in syphilitic involvement of the lung. Eighty per cent of the cases reviewed had concomitant clinical syphilitic lesions, chiefly of the skin, bones and viscera, while 40 per cent of the cases with autopsy had lesions in the liver. Eight per cent of the acquired cases were malignant syphilis. Whereas syphilis of the lung is commonly associated with skin, bone, and particularly visceral syphilis, infection with a neurotropic strain of spirochetes would not seem to predispose to lung involvement. Cases LV and LVI occurred in man and wife, possibly showing a predilection in the same strain of organism.

Trauma.—In only 1 case (CIII) was a history of trauma elicited. This case develped shortly following a blow on the stomach and at autopsy showed gummata of the stomach, intestines and mesenteric lymph-nodes as well as in the lung. Possibly a

more careful anamnesis would show that trauma played a more important rôle than our figures indicate. There is a striking coincidence of gummata of the clavicle, ribs and sternum with gumma of the lung. There is also a marked tendency for the liver to be syphilitic in those cases showing involvement of the base of the lung, particularly the right base. In 1 case the *x*-ray picture showed a large mass which was interpreted as gumma of the diaphragm. In 5 cases with autopsy, gummous processes extended from the liver through the diaphragm and into the lung. In 1 case the gumma involved the lung, bodies of the vertebræ and ribs.

Lack of Treatment.—Detailed data upon this point were not collected. None of the cases had been treated intensively. Most of them had only desultory treatment, or no treatment at all. Several of the malignant cases had received only periodic treatment for manifest lesions. In 40 of the acquired cases, or 37 per cent, infection was denied, or not ascertained.

Heredity.—The best known, oldest and most carefully studied syphilitic pneumopathy is the white pneumonia of the new-born heredosyphilitic. This form is not considered in our analysis. Twelve cases, or 10 per cent of the series, were latent manifestations of hereditary infection. All the cases were markedly stigmatized. The lung lesions occurred at ages varying from two to forty years. Although pulmonary tuberculosis is a common infection in hereditary syphilis, failure to demonstrate the tubercle bacillus in suspected cases warrants the therapeutic test for lues. While syphilis of the lung occurring in heredosyphilis is usually atypical from the ordinary picture of pulmonary tuberculosis, it generally runs a rapid course, and cavity formation occurs early. The most common form of the disease is in association with tuberculosis. Indeed, the bacillus of Koch has been demonstrated in white pneumonia of the new-born. (Ribadeau, Dumas et Ameuille).

Recognition.—One of the important causes for the prevalence of lung syphilis is the fact that incipient, and indeed, advanced cases are not recognized. Particularly the latent type of the disease is rarely suspected from the symptoms. Of the 55 cases with autopsy, the diagnosis was made on the table in 51. Cases LXXI, LXXXVI, CIX, and CXII were correctly diagnosed previous to autopsy. These were all cases of latent syphilitic phthisis in which the symptoms were marked. Four of the cases came to autopsy with a previous diagnosis of pulmonary tuberculosis. The remainder were either undiagnosed, or no data were given. Many were unsuspected.

In 66 cases of the entire series, data regarding the diagnosis were given. Only 8 of the 66 cases came to autopsy. Thirty-six cases, or 55 per cent, had been diagnosed and treated as pulmonary tuberculosis. Twenty-four cases, 39 per cent, were correctly diagnosed from the findings. In 16 cases, 24 per cent, the diagnosis was made after the appearance of associated syphilitic lesions. The diagnosis was established in 22 cases, 35 per cent, by applying therapeutic tests.

Early or Secondary Pulmonary Syphilis

This condition can be dismissed with a word. In a few of the cases mild bronchitic symptoms dated from the period of the exanthem. Secondary pulmonary syphilis is classified as secondary dyspnea and secondary bronchitis.

Secondary dyspnea is observed most commonly in nervous persons and is considered by Fournier to be a purely nervous phenomenon. It is mild and disappears spontaneously. There are no physical signs.

Secondary bronchitis is considered by Fournier as hypothetical. It was first described by Schnitzler in 1880. Lancereaux says it is due to analogues of the cutaneous eruption occurring in the respiratory tract. He was able to see in the upper respiratory tract macules and papules which simulated the cutaneous exanthemata. Lepine (*These de Paris*, 1907) believes that the condition has not been proven to be specific. It is a rare affection and consists of a diffuse bronchitis, often febrile, with râles at the apices. This would make it resemble tuberculosis.

Rössle states that the early stages of syphilitic lung lesions are unknown.

Associated Disease and Cause of Death.—Tuberculosis is the most common associated affection, but such cases were excluded from the collection. One case followed scarlet fever; and 1 patient died of diphtheria. Erysipelas was the cause of death in 1 case. One patient died of acute infection; 1 of acute endocarditis. In a few cases pneumonia closed the clinical picture. Many of the cases ran the usual course of the phthisical, exodus resulting from hemorrhage, exhaustion, or toxemia. In a few cases, death came from suffocation. Two other cases followed tracheotomy. One case succumbed from complications due to menopause. Three cases were moribund when observed. In 6 cases death was due to cardiorenal complications. Several cases presented gastric symptoms. In 2 the final picture was that of liver disease with icterus and ascites. In an interesting case reported by Ziemssen, there were signs and symptoms of syphilis of the lung, the patient having expectorated large masses of lung substance. The patient recovered on specific treatment, and a year later died of carcinoma of the lung. The malignancy might well have had its origin in the hyperplastic change of the alveolar epithelium which is so common in syphilitic pneumopathies.

Pathology.—Notwithstanding the discovery of the bacillus of Koch, and the recognition of the causative agent in syphilis, we may still reiterate the oft-quoted statement of Virchow, that there is no definite pathological picture which is characteristic of syphilis of the lung. The diagnosis must be made from a careful consideration of many points, and even then it is neither easy nor always possible.

Warthin in 1918 established the new pathology of syphilis and it is in the light of this that lung syphilis should be considered. And it has been so studied by Carrera working in Warthin's laboratory.

Warthin says: "The gumma is not the essential typical lesion of old or latent syphilis. It is a relatively rare formation. The essential tissue-lesion of either late or latent syphilis is an irritative or inflammatory process, usually mild in degree, characterized by lymphocytic and plasma-cell infiltrations in the stroma, particularly about the blood-vessels and lymphatics, slight tissue proliferations, eventually fibrosis, and atrophy or degeneration of the parenchyma. These mild inflammatory reactions are due to the localizations in the tissues of relatively avirulent spirochetes. The pathologic diagnosis of syphilis is essentially microscopic."

Carrera studied microscopically lung tissue from 152 known syphilitics and found 3 cases of gumma of the lung, 2 cases of syphilitic peribronchitis with arteritis, 4 cases of syphilitic fibrosis with arteritis, and 3 cases of syphilitic arteritis, though he admits that probably many more cases would have shown luetic changes had it been possible to make more thorough and extensive examinations.

Classification.—It has long been customary to classify syphilitic lung pathology as:

(1) Pneumonic forms.
(2) Gummous processes.
(3) Syphilitic pulmonary sclerosis.
(4) Bronchiectasis.
(5) Suppurative processes, ulceration and gangrene.

Syphilitic Pneumonia

The pneumonic forms, while common in the new-born heredosyphilitic, are more rare in the acquired cases. The simplest type described is the gelatinous infiltration of Hiller, being the catarrhal process of other authors (Beriel). The lobe is hard, heavy, and non-aircontaining. In color it is gray or reddish, and shows a homogenous gelatinous aspect upon section. On pressure a viscous fluid, rich in cells, exudes. Microscopically, there is infiltration of the alveolar walls with small cells. The alveoli are filled with desquamated epithelium. In a more advanced stage there is alveolar necrosis, and finally sclerosed zones. According to Hiller the interstitial infiltration comes as a result of compression of the small

pulmonary vessels with edema. However, he suggested that it might be a combination of ordinary pneumonia with syphilitic pneumonia. Schnitzler believed it to be an early stage of indurative syphilitic pneumonia. Hiller says this form comes on late in life and leads rapidly to death. Others believe that the condition becomes caseous. Beriel does not believe that it is specific.

Macroscopically there are two types of interstitial pneumonia described. These types differ but slightly, the first being white pneumonia of the adult resembling the same condition in the new-born, the second being gray induration. The lesions consist of islands in the lung parenchyma the size of a nut or egg, though cases of lobar involvement have been reported. Interstitial pneumonia occurred in 28, or 50 per cent of the cases with autopsy. The location follows the general distribution of syphilis in the lung.

In a cut section the foci are well limited, fleshy in consistency and of elastic hardness. There is little fluid on pressure; occasionally there are bubbles of air. Crepitation is rare. The affected portions sink in water. It is most often associated with bronchiectasis or gumma, and the connective tissue shows sclerosis more or less advanced.

Microscopically, the condition is analagous to white pneumonia of the new-born. There is thick cellular infiltration of the interstitial tissue. The alveoli are packed full of small cells and are somewhat smoothed out or collapsed. Some are large and contain large cells and lymphocytes. The epithelium of the alveoli is cubical and there is new formation of alveoli. In other places the cells become large and clear and look like epithelioid cells. There are often giant-cells with many nuclei; they are sometimes arranged peripherally as in tuberculosis, but they are frequently not so arranged.

There is associated infiltration of the small bronchi, thickening of the adventitia of the arteries, less commonly endarteritis, periarteritis being the more constant finding. Occasionally there is *endarteritis obliterans*. The pleura is infiltrated with cells and shows vascularization and sclerosis. Adenomatous formations are sometimes described like those occurring in white pneumonia of the new-born.

Fournier believed in the existence of a caseous pneumonia as a result of necrosis of the foci of catarrhal syphilitic pneumonia. The establishment of such an entity is on a rather doubtful footing.

The pneumonic types were not observed by Carrera. However, cases are certainly frequently met with clinically and respond phenomenally to antiluetic treatment.

Gummata

Macroscopically these are the most characteristic lesions of syphilis of the lung, consisting ordinarily of nodular formations well delimited by a ring of sclerosed tissue, the center being necrosed. Thirty-two cases, or 59 per cent, presented gummata. In 6 of these cases the lesions were single, in 26 multiple. About half were stated to be caseous. The location follows the general localization of syphilitic involvement of the lung. Gummata may occur subpleurally. In many of the cases the lesions were extensions from, or in association with, gummata of neighboring parts.

Gummata are round, sometimes irregular, of hard consistency, often elastic. In the late stages they become soft, but are generally more firm than tuberculous lesions. On section they are dry, not friable. Their size varies from miliary to that of a hen's egg. Commonly subpleural fibrous bands radiate from the hilus, gumma or gummous scar, causing depressions of the parenchyma and forming lobulations. The nodules do not become calcareous as in tuberculosis. Their color is white, gray or brown.

Microscopically, according to Carrera, caseous gummas show a central caseous area, an intermediate fibrous zone with many new blood-vessels and an outer vascular, infiltrated zone rich in plasma-cells and lymphocytes. The outer zone is never as sharply circumscribed as the edge of a tubercle. Gummata are discrete as distinguished from tubercles which are confluent.

The tissues surrounding the smaller lesions often show a heavy deposit of anthracotic pigment. "The central caseous zone presents the appearance of a coarsely granular caseation in which few nuclei in varying stages of karyorrhexis are seen. The outlines of capillaries containing blood-cells and fibrin can still be made out. There is no fibrin presented in the caseous area except in these vessels, in contrast to the fibrin threads so abundantly found in the caseous centers of tubercles. The intermediate fibrous zone is made up either of young fibrous tissue or of an older, more hyalin form, but never distinctly epithelioid, as in the tubercle. Fibroblasts appear, and great numbers of angioblasts in the form of cords or young capillaries containing blood-cells. The zone usually shows many plasma-cells and lymphocytes, and these increase in number in the outer infiltrated zone, which may appear to be composed almost entirely of plasma-cells, but capillary proliferation and increase of stroma can always be determined in this zone. The larger blood-vessels in part show the picture of syphilitic endarteritis, particularly when the vessels appear to be the starting place of the gummatous process. Other vessels show hyalin change. Many very small infiltrations of lymphocytes and plasma-cells, with occasional endothelioid cells occur." Giant cells, like those occurring in tuberculosis are present, but they are not so numerous as in tubercles. In the caseous area, the alveolar structure may be preserved. In general the elastic tissue is better preserved than in tuberculosis. The epithelial proliferation in the alveoli described by many authors was not observed by Carrera. He states that the scars of healed gummas are very characteristic, being vascularized, never round, but rather having an irregular form with extensive ramifications.

Differentiation at the autopsy table of gummata of the lung from similar tuberculous lesions is difficult. In favor of gumma of the lung are: (1) *Location.*—Tuberculous nodules most commonly occur in plain lung parenchyma. (2) *Absence of calcification.*—Calcification is unknown in gummata of the lung. On the other hand, fatty degeneration is said to be more common in gumma. (3) *Encapsulation.*—This is said to be a constant finding in gummata of the lung; it is more rare in tuberculosis.

Microscopically the following are said to aid in diagnosis: (1) In gummata the fundamental structure of the normal tissue is said to be recognizable; (2) the presence of more or less altered blood-vessels is characteristic of gumma; (3) newly formed alveoli with cubical epithelium is mentioned in gumma more frequently than in tuberculosis; (4) *endarteritis obliterans* and periarteritis are more common in gumma than in tubercle; (5) infiltration of the small bronchi occurs more frequently in syphilis; and (6) proliferation of smooth muscle fibers is characteristic, but not constant, of gumma.

It is not easy to demonstrate either the tubercle bacillus or the spirochete in diseased tissue. Schmorl has demonstrated spirocheta in the lung, but his findings are open to doubt. Warthin has found spirocheta pallida in lung tissue. Tuberculous lesions, developing in guinea pigs, following inoculation of pieces of diseased lung tissue, would confirm the diagnosis of tuberculosis. This test was applied with negative results in 3 of the cases. The lung tissue could also be planted in rabbit testicle to detect the presence of the spirochete.

Regarding differentiation of gumma from tubercle of the lung, Carrera says: "The formed gumma and the developed tubercle can be readily distinguished by the vascular, closely packed, epithelioid, sharply circumscribed, conglomerating character of the latter, while the gumma appears as a more loosely arranged, less sharply delimited, vascular granulation tissue, scant in epithelioid and giant cells, and infiltrated with lymphocytes and plasma-cells. The scar of the tubercle is round, sharply delimited, with concentric fibers, hyalin, scant in nuclei, devoid of vessels and elastic tissue, less given to anthracotic pigmentation, but more frequently calcified, and very often confluent or con-

glomerated. The scar of syphilis is irregularly radiating or stellate, not sharply delimited, more like ordinary cicatricial tissue, still contains blood-vessels, often with angiectatic capillaries, continuous with the thickened walls of the nearest alveoli, still shows elastic fibers, and the outlines of old vessels and alveolar walls; the scars of gummas are extremely rarely conglomerated or confluent; the syphilitic fibrosis begins under the pleura and around the bronchi, and is more frequently anthracosed, and very rarely calcified. But the most conclusive differential point is the finding in the fibrosis of syphilis of collections of plasma-cells; and such active areas are probably as frequent in syphilitic fibrosis of the lung as they are in syphilitic processes elsewhere in the body."

Syphilitic Pulmonary Sclerosis or Syphilitic Fibrosis

This condition results from the cicatricial termination or healing of all syphilitic pneumopathies. It was present in 28, or 50 per cent of all cases. In addition, cicatrices, as such, were mentioned in about 10 per cent of the cases. Commonest in adults of middle age, the picture consists in white hard bands or nodules which creak under the knife, in short, having all the aspects of ordinary sclerosis. The condition is described as: (1) A fine network throughout the lung parenchyma; (2) a thickening of the connective tissue following the bronchi, vessels and the interalveolar septa; (3) existing chiefly in the interalveolar and interlobular septa and in the adventitia of the vessels; (4) radiations of fibrous tissue from the hilus, following the bronchi; and (5) induration of the surface of the pleura by bands of fibrous tissue running on the surface and deeper, causing lobulation and furrowing analagous to syphilitic liver.

Histologically one finds ordinary fibrous tissue poor in cells. Carrera states that the positive diagnosis of syphilis cannot be made in such cases without the typical inflammatory process due to the local action of the spirochetes, of which fibrosis is the termination or sequel. It must therefore be diagnosed from the active areas, though certain characteristics of the syphilitic scar may at times be of aid. The process extends along the vessels and bronchi. From a comparative study of 152 cases of lungs of syphilitics with 60 cases of tuberculous lungs, Carrera is convinced that it is never impossible to distinguish the fibrosis of tuberculosis from that of syphilis.

Bronchiectasis

Dilatation of the bronchi, or bronchiectasis, occurred in 24 of the cases, or 47 per cent. The bronchiectases simulate cavities. Histologically they are lined by characteristic epithelium. There is also present new formation of cubical epithelium. Another important point is the augmentation of the circulation in the walls. Bronchiectasis was not noted by Carrera. However, 2 of his cases showed syphilitic peribronchitis, the essential changes consisting in plasma-cell infiltration, new-formed vessels, vascular connective tissue around the infiltration with anthracosis. The bronchial epithelium was well preserved. There was sclerosis. Cuboidal cells were noted. The vessels showed typical syphilitic infiltrations of intima and adventitia. There was new-formed muscle in connection with the bronchi. The elastic tissue of the bronchus was either destroyed or displaced by the infiltrations.

Suppurative Processes, (Ulceration and Gangrene)

Suppuration.—In many cases pus can be squeezed from the air spaces and bronchi, showing a chronic bronchitis. This condition was described in 7, or 13 per cent of the cases with autopsy. Microscopically, there is an intense infiltration of small cells which should not be confounded with miliary gummata, the latter being very dry in comparison.

Ulcerous Lesions (Syphilitic Phthisis).—Ulceration of gummata of the lungs has fre-

quently been described. Cavity occurred in 22 per cent of the cases with autopsy. Clinically it would seem to be exceedingly common. The gumma may develop near the wall of a bronchus and ulcerate and empty into it, forming a cavity. Cases X and XXI are clinical observations which would seem to represent such an occurrence. The cases are not well described pathologically, and those which have been reported might be confused with a cavity formed by dilatation of a bronchus, which Beriel believes is the commonest syphilitic process in the lung. In latent cases of syphilitic phthisis the commonest cause for the physical signs of cavity is probably dilatation of a bronchus.

Gangrenous Forms.—These have also been poorly established pathologically. Many cases are reported clinically. They probably represent secondary infection in an ulcerated gumma, or result from endarteritis.

Symptoms.—The symptoms noted in the 120 cases may be tabulated as indicated in Table V above.

TABLE V

Cases in which no symptoms were mentioned	5
Cases in which symptoms were not referable to the lungs; i. e., cases with heart and kidney complications, etc.	8
Cases moribund	3
Cases reported as phthisis with no enumeration of symptoms	4
Cases in which general condition was good	3
Cases with cough	102
Cough intermittent in 91	
Cough constant in 11	
Cases with sputum	82
Sputum profuse	31
Sputum mucopurulent	30
Mucus	3
Purulent	21
Nummular	12
Offensive	14
Divided into layers on standing	3
Expectoration of large pieces of lung tissue	9
Guinea pig inoculation performed, result negative for tuberculosis.	5
Spirochetes found (?) [Case of Buchanan]	1
Tubercle bacillus found in none.	
Elastic tissue	4
Bile (broncho-biliary fistula)	1
In a few cases the sputum contained cocci and bacilli.	
Dyspnea	40
Cyanosis	5
Hoarseness	9
Chills	9
Fever	54
Night sweats	37
Malaise	6
Pain in chest	32
Hemoptysis	44
Profuse	27
Blood-tinged sputum	17
Weakness	28
Emaciation	52
Cachexia	11
Anorexia	15
Bronchitis	6
Cardiorenal symptoms	5
Intercurrent disease	15

Physical Findings.—The physical findings are best illustrated by the items of the following tabulation in Table VI.

Discussion of Tables V and VI.—A review of Table V will emphasize many important points, first among which is the striking analogy of clinical lung syphilis to clinical pulmonary tuberculosis.

Cough is the most constant symptom, being mentioned in 88 per cent of the cases. In many cases this began as a dry cough, in others it was productive from the onset. It was constant in 10 per cent of the cases. In the majority it was intermittent.

Expectoration was recorded in 71 per cent of the cases. In 40 per cent of these the sputum was profuse. In 39 per cent of the cases it was described as mucopurulent; in 27 per cent as purulent; in 15 per cent as nummular; and in 18 per cent as offensive. In 9 of the cases, or 7.5 per cent of the entire series, there were periods during which the patient coughed up large pieces of pulmonic tissue, indicating the disintegration and discharging of a gummatous process in the lung. The expectorated masses varied in size up to that of a large bean, and microscopically were altered lung parenchyma. In Case XXXVII, reported by Buchanan, spirochetes were demonstrated in the sputum. Such finding, however, is subject to doubt. The organisms may well have come from the mouth.

In Case C there was expectoration of bile. Autopsy revealed a broncho-biliary fistula, due to a syphilitic process. In a similar case reported by MacDonald, the patient coughed up gall-stones.

Table VI

Cases which were not examined physically	21
Cases showing involvement of both lungs	33
Cases showing involvement of right apex	42
Cases showing involvement of right middle lobe	18
Cases showing involvement of right base	20
Cases showing involvement of left apex	45
Cases showing involvement of left base	28
Cases showing lessened movement or retraction	20
Cases showing impairment of resonance	56
Cases showing râles	64
Cases showing cavity	27
Cases showing increased breath sounds	16
Cases showing diminished breath sounds	19
Cases showing tubular breathing	22
Cases showing pneumothorax	2
Cases showing pyopneumothorax	1
Empyema	1
Pleural effusion	7
Tapped	5
Clubbed fingers	1
Cases in which the *x*-ray was used in diagnosis	15
Cases in which Wassermann blood-test was performed	22
Von Pirquet test (positive in 1 case, negative in 3 cases)	4
Tuberculous complement-fixation test negative	2
Friction	4
Tracheal stenosis diagnosed with laryngoscope	1

Dyspnea was present in 33 per cent of the cases, to which various causes may be ascribed. In many cases it was due to laryngeal involvement or to tracheal stenosis. At other times it was due to toxemia. In the majority of cases it was due to direct involvement of the lung.

Hoarseness was recorded in 9 cases. In several this condition progressed to complete aphonia.

Forty-five per cent had *fever*, the pulse and respiration being, as a rule, correspondingly high. Thirty-one per cent had *night sweats*.

There was *pain in the chest* in 27 per cent. *Hemoptysis* occurred in 37 per cent. Forty-four of the cases complained of *loss of weight*. In 3 cases the general condition was stated to be good. In 8 other cases the symptoms presented were in no way referable to lesions in the lungs, the most common clinical picture being that of a cardiorenal syndrome.

The *location of the lesions in the lungs* was determined by physical signs in 83 cases, as follows:

TABLE VII

Right upper lobe	50%
Left upper lobe	54%
Right middle lobe	22%
Right lower lobe	24%
Left lower lobe	34%
Both lungs	40%

It is obvious therefore, that in the clinical cases involvement of the upper lobes was about twice as common as lesions in the bases, or in the right middle lobe. Nearly half the cases presented lesions in both lungs.

Râles were the most constant finding. In 27½ per cent of the cases there were signs of cavity. Two per cent of the cases presented pneumothorax; 1 per cent pyopneumothorax. Empyema resulted in 1 per cent of the cases. Pleural effusion occurred in 7 per cent. There was pleural friction in 3 per cent of the cases. In 22 of the 120 cases the Wassermann reaction was performed on the blood of the patients. In all it was strongly positive.

X-ray.—The *x*-ray was employed in 15 cases. In some the involution of the lesions was controlled by plates.

Buchanan's case (XXVII), observed in 1907, in which spirochetes were demonstrated, showed diffuse areas of infiltration of both bases which improved under treatment.

In 1912 Daniells and Dachtler (*Am. Quart. of Roentg.*, iv, 20,) studied roentgenographically 150 cases of suspected tuberculosis of the lungs and found 8 cases which they called syphilis of the lung. The roentgen findings were not characteristic and the authors concluded that the *x*-ray was of value in such cases only in excluding tuberculosis.

In 1914 Kayser published what he considered the first radiographic demonstration of the involution of a gumma of the lung (Case LIII).

In 1914 Blinder (Case XL) described both hilus regions densely infiltrated, with possibly a gumma of the diaphragm.

In 1915 Callender (*Interstat. Med. Jour.*, xxii, 598,) affirmed that the shadows of lues of the lung are clear-cut and sharp with no tendency to mossiness of the borders. These claims do not conform with the views of most observers, or with the pathologist.

In 1916 Bauch reported radiographically on 2 cases (XLI and LXIII). One case showed unilateral involvement with dense fibrous bands, cavities, adhesions, pneumothorax in the upper half, and with dense peribronchial infiltration, density in axillary portion (thickened pleura?), and bronchiectasis in the lower half. The mediastinum was displaced toward the pathology. The other case showed unilateral involvement, diffuse peribronchial infiltration, particularly the roots of the lung, with dilated ascending aorta.

In Post's cases observed in 1916, (LXIV and LXV) a dark shadow was confined to one side with the heart drawn toward the periphery.

In the Deutsche Fortschrift an dem Gebiete der Roentgenstrahlen (1918-19, xxiv, 6), there is a description of the roentgen picture of a syphilitic lung which later came to autopsy. Examination by the roentgenoscope showed a blurred left apex anteriorly, and shadows over both apices posteriorly. There were discrete spots with exaggerated hilus in right lung. At the left interlobar area dorsoventral transillumination showed a deep band-like shadow passing upwards, with its base toward the hilus and apex toward the periphery. The lower portion of the lung was blurred and shadows, which were not freely mobile were seen over the left heart as well as over the diaphragm. The mediastinum was free, and the aorta was enlarged. There was no inspiratory dis-

placement of the mediastinum into the normal half of the thorax. The shadow configuration with the base towards the hilus is considered by the author as characteristic of the most frequently occurring form of pulmonary syphilis in adults.

At autopsy the wedge-shaped shadow corresponded to dense pleuritic scar tissue together with thickened bronchial walls and cavities filled with secretion.

In a case of syphilitic aneurysm of the pulmonary artery (Warthin, 1917), roentgen plates showed an egg-sized shadow in the left postscapular line extending from the second to the fourth rib, fairly sharply defined on its outer border, but poorly defined elsewhere and separated by a small space from another similar shadow occupying the right upper hilus. In this case there was no syphilis of lung tissue.

Funk's cases, (CXVIII, CXVIX and CXX) observed in 1919, were examined radiographically by Manges. In one case the root shadows were heavy on both sides with general increased peribronchial thickening more marked on the right, and involving the lower lobe more than the upper. This case approached normal appearance after specific therapy. Another case showed bilateral disease, no description of the lesions being given. In the third case Manges states that the right apex was clear. At the lower border of the upper lobe and possibly the upper portion of the middle lobe, there was a mass of considerable density, without definite shape and with very ill-defined margins, probably mostly fibrous tissue; it was not the type usually seen in fibrosis, since it appeared infiltrating. In the right lower lobe there was considerable fibrous tissue and a few small cavities, probably bronchiectatic. The picture resembled an organizing pneumonia. There was no tuberculosis.

Lisser (1918), and Boisliniere (1920) both describe cases in which before treatment the entire left chest was uniformly dense. In 1 case fluid was removed. In the latter case taps were dry. Both cleared up on antiluetic treatment, leaving some increased markings.

In 1917 Watkins wrote extensively on the roentgen diagnosis of lung syphilis. He states that the condition must be differentiated from bronchiectasis, abscess, malignant tumors, pneumokoniosis, unresolved pneumonia and tuberculosis. Cancer gives shadows with sharp margins, while syphilis has irregular borders. We cannot agree with him that absence of cavity is a peculiarity of syphilis. He believes that pneumokoniosis resembles combined syphilis and tuberculosis. His statement that no roentgenologic differentiation can be made between lung syphilis and unresolved pneumonia seems to hold for cases of syphilitic pneumonia.

Differentiating the shadows of syphilis and tuberculosis, Watkins states that syphilis invades the lower and middle lobes and tuberculosis the upper. In syphilis the densest shadow begins at the hilum and diminishes toward the periphery, while in tuberculosis characteristic shadows surround the apical or subpleural lobules. In syphilis the shadows do not bear a distinct relation to the bronchi, whereas those of tuberculosis are perilobular and show a definite relation to some branch of the bronchial tree.

In 1920 Watkins, after consideration of the pathological work of Carrera, emphasized that we are entering the fourth, or roentgenological period in the study of syphilis. He concludes that lung syphilis can be diagnosed radiographically, that the *x*-ray evidence must be substantiated by clinical signs and therapeutic tests, and that his *x*-ray classification follows pathologic studies.

Watkins first took cases of syphilis of the heart and aorta with chest shadow and was able to differentiate them from tuberculosis. These shadows cleared up on specific treatment. Having learned the radiographic characeristics of lung syphilis, he similarly studied known syphilities without heart or aortic involvement. Next he studied patients without positive blood Wassermann reactions.

Out of 5000 cases of which chest plates had been taken, he was able to diagnose lung syphilis in 3 per cent of the cases, and combined pulmonary tuberculosis and syphilis of the lung in from 10 to 15 per cent of tuberculous cases.

He found gumma in 10 cases, always in combination with other types. He states gummata may be of various sizes, multiple, discrete, with irregular mossy edges gradually fading into surrounding clear areas. When caseous, the centers are of diminished density. When healing, the shadows are stellate.

Peribronchial fibrosis was noted in 39 cases as marked and diffuse linear radiations from the hilus either into all or certain portions of the lung, more diffusely distributed than tuberculosis and not showing calcification.

Syphilitic bronchopneumonia occurred 58 times, the patches being more irregular in outline than ordinary pneumonia, more confluent and with more mossiness of the edges, more localized in the bases and resembled carcinoma or pneumokoniosis. He states that it may be confused with abscess, bronchiectasis or lobar pneumonia.

He noted dense fibrosis of the lung and pleura five times; in each case there was extreme density of one lung with contraction and retraction of the heart and mediastinum.

In conclusion he speaks of indefinite lung densities occurring in 34 cases, resembling the water-logged and edematous lung of influenza and accompanying cardiac syphilis or aneurysm.

From the foregoing we may say that the roentgenology of syphilis of the lung largely remains to be written. Syphilis, like tuberculosis, is a protean disease and should be expected to give upon the plates varying changes. In a great many of the cases the microscope alone can differentiate the luetic from a tuberculous or other process. However, just as tuberculosis often gives characteristic shadows which are unmistakable, we believe that careful study will likewise establish pathognomonic roentgenological pictures of certain types of syphilis of the lung. To establish such pictures, it is helpful to take into consideration the new pathology of syphilis. Great change in the picture due to therapeutic measures cannot always be expected. A syphilitic pneumonia should give decided changes in the roentgen picture under specific therapy. Gummata should likewise melt away like magic in the roentgenogram. Less change is to be expected in the fibrous and sclerosed processes. A vomica will persist in the radiologic picture after therapy, whether it be luetic or tuberculous. We also state with assurance that a lighting up or extension of a pathological picture under therapy speaks for tuberculosis. And in the roentgenogram, again, as in all other approaches to the etiology of doubtful chest lesions, much difficulty is introduced by the numerous cases of combined tuberculosis and syphilis of the lung.

Recalling again the new pathology of syphilis, we are forced to sound the warnings of Warthin and Carrera to the effect that syphilis is the most important etiological factor in cardiac disease that the heart shows changes in all cases of lues and these heart changes are commonly associated with grown induration. In 100 autopsies on non-syphilitics, 5 cases showed brown induration. Twenty-eight per cent of syphilitics showed brown induration and 82 per cent showed pulmonary changes of chronic passive congestion. Either of these two latter conditions is distinguished only microscopically from syphilitc sclerosis of the lung. It is requiring a great deal from the best pair of *x*-ray plates to enable one to definitely distinguish these microscopical conditions. The demonstration of a luetic aortitis, of course, speaks for syphilis, but it does not say that associated lung changes are due to localization of the spirochete and are not secondary to luetic changes in the heart muscle with consequent brown induration of the lungs or chronic passive congestion. The latter condition might improve markedly upon treatment, and yet the case is not proven to have been lues of the lung.

The so-called peribronchial type of syphilis of the lung would seem to offer difficul-

ties of diagnosis. Many of us are familiar with the reluctance with which radiographers diagnose peribronchial tuberculosis and the disinclination of many of the leaders in the field to venture the diagnosis of bronchitis from the roentgen plate. The hilus is the region of romance in the chest to the radiographer. It shows so wide a range of changes in the normal, being the seat of the regions in question. Serial plates for comparison should have equal amounts of exposure with equal quality of ray. The focal-plate distance and the position of the tube and patient and plate should be identical at all exposures and the dark-room work should be of uniformly good quality. With present-day roentgen apparatus and efficiency these requirements can all be met.

TABLE VIII

Pathology in the Lung

Single gumma	6
Multiple gummata	26
Syphilitic interstitial pneumonia	28
Bronchiectasis	24
Cicatrices	10
Sclerosis	28
Cavities	12
Gangrene	1
Involvement of the pleura	18
Thickened and adherent	13
Thickened and adherent with fluid	1
Fluid or pus in pleural cavity	4
Gummata of lymphnodes at hilus	4
Bronchi filled with pus	7
Peribronchial lesions	11
Empyema	1
Guinea-pig inoculations negative in	3
Spirochetes negative in	2
Spirochetes positive in (Case II)	1

TABLE IX

Location of Lesions in the Lung

Both lungs	16 cases	36 per cent
Right upper lobe	24 cases	55 per cent
Left upper lobe	16 cases	36 per cent
Right middle lobe	19 cases	43 per cent
Right lower lobe	30 cases	68 per cent
Left lower lobe	16 cases	36 per cent

dust bins of the lung and in addition the location of the lymph glands whose size, number, density and distribution are so often in direct proportion to the pulmonary history of the patient, the acute infections of childhood, the "common colds" and other respiratory ailments.

In determining the nature of chest pathology and changes due to therapy, it is necessary to observe a rigid technic. The plates should be in stereo, properly exposed with a fine-focus gas tube, and so developed as to bring out the greatest possible detail in the

Autopsy Findings.—It will be of interest to note the readings in Tables VIII and IX, as well as the comments which follow.

In Case II which was a typical clinical case of lobar pneumonia, the lung was reported as densely filled with spirocheta pallida, no other organisms being present.

A comparison of Table VII with Table IX is interesting. Whereas clinical syphilis of the lung is twice as common in the upper lobes as in the bases, the findings at autopsy would not at first glance seem to bear out this ratio. There are, however, various ex-

planations for the apparent discrepancy between clinical and autopsy findings. In the first place, owing to a time-honored belief that syphilis of the lung always occurred in the bases, in many of the cases diagnosed at autopsy, the limitation of the pathology to the bases has been the sole factor which has led to careful study and subsequent diagnosis of syphilis rather than tuberculosis; whereas, in the clinical cases, the therapeutic test has been the most potent diagnostic point. For many years in the early period of the pathological study of pulmonary syphilis, involvement of the base was the only characteristic by which syphilis of the lung was distinguished from pulmonary tuberculosis. Many of the cases with autopsy considered in this paper were observed and reported during this period. Due to the generally recognized difficulty in diagnosing the condition from tuberculous infection, cases of syphilitic involvement of the upper lobes of the lung have for a long time been overlooked pathologically. Furthermore, 8 of the 44 cases in which the location of the lesions was stated were extensions of gummatous processes from the liver, diaphragm, bodies of the vertebræ, or stomach and intestines, and naturally the bases were the sites of attack. In such cases the widespread syphilitic pathology was the most conclusive factor in clinching the diagnosis of gumma. A large majority of the cases coming to autopsy were late chronic cases of syphilitic pneumopathies, many of which showed no symptoms referable to the lungs.

We believe that syphilis of the lung begins most often in the upper lobes, the involvement proceeding downward. It is a common finding at autopsy to find active syphilis in the bases and older sclerosed areas in the right middle, or upper lobes. As a clinical illustration of such a process, we recall a patient in our own experience who first presented herself with involvement of the apices and whose case was diagnosed and treated as pulmonary tuberculosis. Four years later, after the appearance of an extensive cutaneous syphilid, the physical signs pointed to involvement of the right base, the commonest location of active syphilis of the lung at autopsy, and indeed, the site generally said to be the most frequently invaded by the spirochete.

From our study of the cases, therefore, we conclude that early clinical cases of syphilitic infection of the lung most often show involvement of the upper lobes. Cases seen late, or at autopsy, show involvement of the bases as frequently as in the upper lobes. The location of the lesions, therefore, is not so important a diagnostic factor in eliminating tuberculosis as it has long been believed to be. Pathology in the apices by no means precludes consideration of syphilis. Involvement of the bases or middle of the lungs speaks for syphilis. Syphilitic lesions of the upper lobe of the lung, however, differ from tuberculous infection in that the signs are not so frequently elicited at the extreme apices, but rather in the infra-clavicular region. In this respect the findings at autopsy substantiate the physical signs and *x*-ray picture. In a large majority of the cases showing syphilitic lesions in the upper lobes, such lesions were located below the middle, or in the base of the upper lobes. It is also common to find similar pathology in the contiguous portion of the adjacent lobe. Generally speaking, therefore, the physical signs of syphilitic involvement of the lung, while not uncommon in the apices, are, however, most frequently elicited over that region of the chest lying between the clavicles and the bases. From the data at hand, there is a much greater tendency for involvement on the right side. In other words, pathology in the right lower quadrant of the chest is strongly suggestive of syphilis of the lung.

Summary.—(1) One hundred and twenty cases of syphilis of the lung have been carefully selected from the literature and analyzed.

(2) The history of syphilis of the lung is as old as the history of syphilis.

(3) Syphilis of the lung occurs more frequently than it is recognized.

(4) The disease has been most commonly recognized in the early part of the fourth decade of life.

(5) It is more common in males than in females, and more fatal in the latter.

(6) As recognized in the past, lung accidents are among the latest manifestations of the disease. Ten per cent of the cases occurred as late involvement in hereditary syphilitics.

(7) Fifty-five of the 120 patients came to autopsy. Out of 66 patients treated, 56 were cured, 5 improved, 1 showed no improvement and 4 died.

(8) Eighty per cent of the cases showed concurrent or previously active syphilitic lesions, which were clinically recognizable. In addition to this all of the hereditary cases were stigmatized.

(9) Syphilis of the lung is relatively common in association with bone, cutaneous and visceral syphilids, rare in association with central nervous involvement.

(10) Twenty per cent of the cases with autopsy showed amyloid changes in other organs. Twenty per cent had syphilitic aorta and forty per cent syphilitic livers.

(11) Trauma apparently plays a very small part in the localization of the spirochete in the lung.

(12) None of the cases had previously received proper anti-syphilitic treatment; in most, treatment had been desultory. In 37 per cent of the acquired cases primary infection was denied.

(13) Of the 55 cases with autopsy only 4 were correctly diagnosed *ante mortem*.

(14) Fifty-five per cent of the cases had been diagnosed and treated as pulmonary tuberculosis. In 24 per cent the diagnosis was made upon the appearance of associated syphilitic lesions. In 35 per cent of the cases the diagnosis was determined after the therapeutic test.

(15) Syphilis of the lung in the early secondary or florid period of infection is not well established. However it is reasonable to believe that lesions corresponding to the cutaneous exanthemata may well occur in the lung at the time of the generalized spirochetosis.

(16) Syphilis of the lung occurring together with pulmonary tuberculosis is the commonest type of syphilitic pneumopathy.

(17) The pathology of syphilis of the lung is the new pathology of syphilis established by Warthin, and the diagnosis is essentially microscopic.

(18) Syphilis of the lung is commonly classified as, (*a*) interstitial pneumonia, which occurred in 50 per cent of the cases with autopsy, (*b*) gummata, which occurred in 59 per cent of the cases with autopsy, (*c*) syphilitic pulmonary sclerosis or fibrosis, which occurred in more than 50 per cent of the cases with autopsy, (*d*) bronchiectasis, which occurred in 47 per cent of the cases with autopsy, and (*e*) suppurative processes, ulceration and gangrene. Suppuration was noted in 13 per cent of the cases with autopsy, cavity in 22 per cent of the cases with autopsy and gangrene in 1 case with autopsy.

(19) The symptoms of pulmonary syphilis are the symptoms of pulmonary tuberculosis.

(20) The physical signs of pulmonary syphilis resemble the physical signs in pulmonary tuberculosis.

(21) In the clinical cases without autopsy the upper lobes were involved about twice as commonly as the bases. Nearly half of the cases showed involvement of both lungs.

(22) The roentgen ray has been a valuable factor in the past in differentiating syphilis of the lung from other conditions. It should become increasingly valuable in the future.

(23) At autopsy both lungs were involved in 36 per cent of the cases. The lesions were much more common on the right side, 68 per cent showing involvement of the right lower lobe, 55 per cent of the right upper lobe, and 43 per cent of the right middle lobe, while only 36 per cent showed involvement of the left upper lobe and 36 per cent of the left lower lobe.

(24) Syphilis of the lung most frequently involves the upper lobes first, the process proceeding downwards. It is more common on the right side.

(25) Pathology in the apices by no means precludes the possibility of syphilis. In-

volvement of the middle or bases of the lungs speaks for syphilis.

Analysis of Cases of Lung Syphilis

Case I.—(Dieulafoy [55], [88], [143]). Male, cough, fever, pain in left apex with tubular breathing and rales, dyspnea, sputum mucopurulent, then nummular. Beginning cavity. Strength failed. Diagnosed acute tubercular pneumonia. Syphilitic orchitis. Chancre 10 months previously. Cure with mercury and KI. Treated later for syphilitic whitlow.

Case II.—(Henske [122]). Female, 20. Chancre 4 months previously followed by secondaries. Severe chill, pain in left nipple region, short dry cough, shallow respiration, high fever and pulse, cheeks flushed, herpes on lips. Consolidation of left lower. Diagnosed lobar pneumonia. Sputum typically pneumonic. Seventh day, entire left lung consolidated. No crisis. Death on tenth day. *Autopsy*: lower lobe, gray hepatization; upper lobe, mottled, red and gray. Pus in pericardial sac. Lung densely filled with spirochæta pallida. No other organisms.

Case III.—(Colleville [142]). Male, 33. Denied infection. Gumma of right upper surface of chest following trauma, succeeded by gumma of left chest wall which involved the sternocleidomastoid and scaleni muscles. Wassermann positive. Involution followed injections of mercury salicylate and KI. Two weeks later sudden chill, sharp pain in right base with brisk cough, dyspnea, fever, mucopurulent expectoration. Fine rales and dullness at left base posteriorly. Dullness, blowing and bronchophony in right axilla, followed by cavity. Night sweats. Sputum nummular and fetid. Complete cure in twenty days on mercurial injections.

Case IV.—(Dieulafoy [58], [89], [143]). Male, phagedenic chancre twenty years previously, followed by pustular syphilid. Eleven years previously malignant rupial syphilid. Oppression over left side for three months. Cough with blood-streaked sputum of foul odor, which divided into layers on standing. No TBC or elastic fibers. Dulness posteriorly over a focus the size of the palm middle of left lung, rough tubular breathing, fine and coarse rales, extreme emaciation, slight fever. Developed cavity with abundant expectoration. Rapid improvement on mercurialization. Still gaining when case was reported.

Case V.—(Feulard [74]). Male, 37. Syphilitic twenty years. Malaise, pain in side, cough, fever and expectoration. Blowing inspiration and rales behind middle of right lung. Diagnosed gangrene. Improved on KI. Later coughing spells with fetid pus, cavity under right clavicle. Diagnosed phthisis. No TBC in sputum repeatedly. Complete and permanent cure on mercurial inunctions.

Case VI.—(Perret [156]). Male, 39. Chancre seventeen years previously. Malaise, fever, blood-streaked sputum, hoarseness. Diagnosed phthisis. Swollen painful left elbow, lost forty pounds, external swelling about larynx the size of an apple. Diminished cog-wheel breathing over entire chest. Crepitant rales. Wassermann positive. Sputum foul. No TBC in sputum repeatedly. *X*-ray: characteristic tubercular infiltration of both lungs, greatest in upper lobes. Cure with sublimate injections and KI.

Case VII.—(Roussel [133]). Female, 24. Five miscarriages. Chills, fever, night sweats, cough, expectoration, loss of twenty pounds. Sputum blood-tinged, mucopurulent, offensive. Dyspnea, loss of appetite. Expansion diminished on both sides, breathing hurried, scattered distinct areas of dullness both sides, particularly at right base. Bronchovesicular breathing over dull areas. Rales. Von Pirquet negative. Many sputum examinations negative. Liver and spleen palpable. Wassermann positive. Diagnosed acute miliary tuberculosis. Gumma developed on fourth rib of right side together with synovitis of extensor tendon of wrist. Immediate and rapid cure with gain in weight on mercurial inunctions and KI.

Case VIII.—(Cube [36]). Male, 34. Chancre nine years previously. Progressive phthisis for years, fever, cough with foul expectoration containing morsels of gummatous material varying from the size of a pea to that of a bean. Dullness over area the size of the palm at inferior angle of right scapula. Rales and large coarse bubbles. Ulcerated larynx. Aphonia. Cachexia, night sweats, hectic fever. Improved on mercury rubs. Relapsed. Complete cure with gain in weight. Cavity remained in lung.

Case IX.—(Fournier [Dr. Latty] [51]). Female, 8. Heredosyphilis. Typical gangrene of the lung. Brought up gummatous material in the sputum. Fetid. Recovery on specific treatment. Evacuation of gumma followed by enormous retraction of one side of chest.

Case X.—(Thompson [77]). Female, 22. Syphilitic four years. Cough, hectic fever, pain in right chest, abundant expectoration, frequent hemoptysis, emaciation. Quart of sputum a day made up of mixture of blood, mucus, pus, caseous debris and shreds of connective tissue. Fetid odor. Absence of respiration on right below scapula. No TBC in sputum. Improved on KI. Six weeks later a second gumma of the lung broke and discharged. Complete cure.

Case XI.—(Zinn [91]). Female, 25. Syphilitic four years. Bloody expectoration two years. Dullness beneath right clavicle, rhonchi, fetid mucopurulent sputum. Improved on mercury rubs. Hemoptysis and increased sputum. Raised lung tissue in sputum. Adenitis, dulness right chest with rales and bronchial respiration at apex. Friction. Gummatous liver. Profuse sputum which divided into layers on standing. No TBC. Continued improvement on mercury inunctions.

Case XII.—(Zinn [91]). Female, 46. Syphilitic four years. Pain in chest. Hemoptysis, cough with expectoration, loss of appetite, sleeplessness. Anemic, leukoderma, adenitis, left chest sunken, involvement beneath clavicle, friction, cough, raised large pieces of lung parenchyma. No TBC. Cavity left upper lobe. Mercury inhalations and KI. Right hemiplegia. Remained well for two years. Signs of cicatrix in lung.

Case XIII.—(Lutz [38]). Male, 34. Syphilitic nine years. Thick greenish sputum for two years. Cough and hoarseness. Progressive weakness. Muscular atrophy of leg. Emaciated, left chest flat, lessened movement and dulness, bronchial breathing, more marked in middle. Knee reflexes absent. Improved for three months on KI. Outbreak of skin syphilis with return of lung signs. Improved on mercury and KI. Caught cold and suffered setback. Both lungs involved. Six weeks later second flare-up. Hemoptysis. Coughed up large quantity of gummatous material with much blood. Thick purulent sputum especially mornings. Cavity. Permanent cure on mixed treatment.

Case XIV.—(Engel [41]). Male, 32. Syphilitic

eight years. Many accidents. Cough, loss of weight, hectic fever, night sweats, hemoptysis, malaise, expectoration of gummatous material. Flatness left infraclavicular region, cavity posteriorly near base. Prolonged expiration with rales on right. Sputum nummular containing gummatous material. Complete cure with gain in weight on mercury rubs and KI. Cicatrix under left clavicle.

CASE XV.—(Schech [40]). Male, 34. Syphilitic three years. Cough, mucus expectoration, fever, night sweats, dyspnea and attacks of suffocation. Pale, anemic, emaciated, adenitis, skin lesions, stridor, left lung posteriorly fifth to eighth rib dulness, bronchial breathing, rales. Profuse expectoration which settled into layers. Raised large pieces of lung parenchyma. Signs of myocardial gumma. Mercury and KI. Developed gumma of left testicle, right testicle and orbit. Cure.

CASE XVI.—(Schech [40]). Male, syphilitic eleven years. Many accidents. Cough, dyspnea, night sweats, anorexia, fever. Repeatedly coughed up blood-covered pieces of flesh. Tracheal stenosis. Pale cachectic, emaciated, involvement of right apex and right middle and lower lobe. Cured with mercury rubs and KI.

CASE XVII.—(Dieulafoy [Girondeau] [58, 88, 143]). Female, 35. Cough and fever. Involvement of middle part of left lung. Emaciation, night sweats, cavity. Sputum nummular and blood-streaked. Gummatous ulcer in right culdesac. Cured on specific treatment. Cicatrix remained. Later treated for osteoperiostitis of frontal bone.

CASE XVIII.—(Dieulafoy [58, 88, 143]). Young male condemned as phthisical. Previous syphilitic accidents. Cough, expectoration, occasionally blood, anorexia, night sweats. Cavity at lower angle of right scapula. Complete cure with mercury and KI.

CASE XIX.—(Dieulafoy [58, 88, 143]). Boy, heredosyphilis. Phthisis with cavity. Complete cure with specific treatment.

CASE XX.—(Dubousquet-Laborderie et Gaucher [43]). Female, 8½. Heredosyphilis. Cachectic, cough, anorexia, night sweats, afternoon fever. Cavity right supraspinous fossa. Diagnosed and treated as TBC. Gumma of sternum. Complete cure with mercury and KI.

CASE XXI.—(Dufour [8]). Female, 24. Cough and hoarseness, night sweats, fever, cavernous rales both apices. Aphonia, suffocation, tracheotomy, cavity left apex. Complete cure with mercury.

CASE XXII.—(Fournier [14]). Male, 33. Syphilitic eight years. Treated for phthisis and getting worse. Cough, abundant expectoration, weakness, night sweats, afternoon fever. Involvement of apices. Panniculus conserved. Appetite and digestion good. Remained well for years following specific treatment.

CASE XXIII.—(Fournier [25]). Young female, phagedenic ulcer of foot. Cough with abundant green sputum, dyspnea, pain in left side, fever, night sweats, anorexia, weakness, emaciation. Cavity left apex. Diagnosed phthisis. Complete cure on specific treatment.

CASE XXIV.—(Gaudichier [48]). Male, 39. Bone and skin syphilis for twenty-three years. Gumma of left clavicle, emaciation, weakness, cough, abundant mucopurulent blood-stained sputum. Cavity left apex. Diagnosed phthisis. Permanent cure with KI. Later treated for ulceration of left leg.

CASE XXV.—(Grindon [128]). Male, 26. Syphilis two years. Bronchitis. Signs over left infraclavicular space. Hectic fever, night sweats, cavity. Mucopurulent expectoration and hemoptysis. Loss of weight. Diagnosed advanced phthisis. No TBC. Permanent cure on specific treatment.

CASE XXVI.—(Jullien [75]). Female, 46. Syphilitic ten years. Gumma of tibia, cachexia, loss of weight, fever and night sweats. Anorexia, cough. Cavity below left clavicle. No TBC. Animal inoculations without accident. Improved on calomel injections. Several recrudescences with hemoptysis. Final complete cure.

CASE XXVII.—(Lancereaux [12, 22, 37, 71]). Female, 40. Heredosyphilitic. Infantilism. Cavity in right lung, cough with expectoration, hemoptysis, anorexia, emaciation, hectic fever. Death. *Autopsy*: Base of right upper lobe indurated, containing many excavations the size of a pigeon's egg. Middle lobe and upper part of lower lobe similar. No TBC. Syphilitic liver, spleen, thyroid.

CASE XXVIII.—(Lancereaux [Gubler] [12, 22, 37, 71]). Robust male. Phthisical for years. Diagnosed phthisis. Exostosis of tibia appeared coincident with onset of pulmonary disease. Cure with mercury and KI.

CASE XXIX.—(Lancereaux [Leudet] [12, 22, 37, 71]). Male, 35. Cough, emaciation. Syphilitic testicle. Signs of involvement of left upper. Cure with mercury and KI.

CASE XXX.—(Levy [90]). Male. Syphilitic six years. Phthisis. Dulness both bases. Dry pleurisy. Cure with mercury and KI.

CASE XXXI.—(Massia [132]). Male, 49. Syphilitic ten years. Cough for five years. No expectoration or fever. General condition good. Involvement of right apex. *X-ray*: Shadow in right apex, dilatation of aortic arch. Systolic aortic murmur. Improved on mercurialization.

CASE XXXII.—(Panas [65]). Female, 32. Syphilitic seven years. Syphiloma of the eye, corona veneris, two miscarriages, hemoptysis, cough with scanty expectoration, loss of forty pounds. Healthy with good appetite. Beginning cavitation right upper. Cure.

CASE XXXIII.—(Poterin du Motel [20]). Male, 35. Vesicopustular syphilid two years previously. Cough, expectoration, dyspnea, night sweats, emaciation. Beginning cavitation in apices. Cure.

CASE XXXIV.—(Stengel [102]). Male, 32. Syphilitic five years. Prostrate, dyspneic, emaciated, cough, wheezing, pain in left hypochondrium, syphilitic bone pain. Depression under both clavicles, syphilitic cicatrices on skin, cavity right apex, fever, abundant mucopurulent and nummular sputum. No TBC. No improvement on treatment for phthisis. Cure with specific treatment.

CASE XXXV.—(Zinn [91]). Female, 27. Secondaries four months ago. Hemoptysis, fever, loss of weight. Syphilitic ulcers of soft palate and larynx, liver enlarged. Involvement of left apex. No TBC. Cure. Two years later patient returned with syphilitic liver. No cough or expectoration.

CASE XXXVI.—(Zinn [91]). Male, 36. Old syphilitic. Cough, hemoptysis, night sweats, fever. Emaciated, adenitis, gummata of tongue, luetic laryngitis, urine contained albumin, blood and casts. Involvement of right apex. No TBC. Complete cure on mercurial inunctions and KI.

CASE XXXVII.—(Buchanan [115]). Male, syphilitic. Phthisis for one year. No TBC. Discrete areas of infiltration in both bases shown by *x*-ray. Spirochæta in sputum. Complete cure with gain in weight on mercury and KI. Progress of treatment controlled with *x*-ray.

Case XXXVIII.—(Massia [Mosny et Malloizel] [132]). Female, 47. Loss of hair nineteen years ago, followed by many cutaneous accidents. Chill with bronchitis. Menopause. Dyspnea, night sweats, diarrhea, hemoptysis, cough. No TBC. Rales over entire chest. *X-ray*: Apices suspicious, bronchial glands enlarged. Mercury and KI administered. Death. *Autopsy*: In base of upper lobe of right lung white pneumonia. Bronchi filled with pus, slightly dilated. Left lung less marked. Peribronchial lesions, atresia of trachea. No spirochetes.

Case XXXIX.—(Massia [Gerest et Wiess] [132]). Female, 42. Old Syphilitic. Broncho-pneumonia followed scarlet fever. Cough, pain at right base, dulness, diminished fremitus, obscure breathing. Sputum adherent, reddish. Rales at right base. Fever. Pulse high. Mercury administered. Pleural effusion. Tapped repeatedly. No TBC. Guinea pig inoculations negative. Death. *Autopsy*: In center of left apex hard nut-sized gumma with cavity in center. Localized area of gangrene in right base. Peribronchial sclerosis both lungs.

Case XL.—(Blinder [139]). Male. Cough, dyspnea, hectic fever, night sweats, weakness, emaciation, chills, pain in chest. Cyanosis. Infraclavicular fossæ retracted, more marked on right. Dulness right apex. Defective resonance both bases. Rales on right. Second aortic heart-sound accentuated. Liver 4fb below costal margin. Knee jerks exaggerated. No TBC. *X-ray*: Both hilus regions densely infiltrated, more marked on right. Diaphragm bulging in middle third (gumma?). Dilatation of aorta. No improvement on treatment for phthisis. Wassermann positive. Admitted chancre seven years previously. Complete cure on salicylate injections and iodids.

Case XLI.—(Bauch [153]). Male, 28. Cough and expectoration, loss of weight. No TBC. Guinea-pig injections negative. Von Pirquet negative. Developed pain in chest, hemoptysis. Treated for phthisis. Retraction above and below clavicles, more on left. Dulness both apices and a strip at left base with fine rales. No TBC repeatedly. *X-ray*: Markedly diminished aeration of entire left lung. Peribronchial infiltration. Ascending aorta dilated. Wassermann positive. Patient's twelve-year-old daughter had interstitial keratitis. Patient refused treatment.

Case XLII.—(Brown [140]). Female, 41. Night sweats, fever, hoarseness, pain in chest, dyspnea, loss of weight and strength, cough, expectoration, blood-streaked sputum. No TBC. Fever, cachexia, pallor, involvement of both apices. Diagnosed phthisis and so treated. No TBC. Wassermann positive. History of lues then obtained. Two intravenous injections of salvarsan.. Patient well two years afterwards.

Case XLIII.—(Burnham [141]). Robust female, 21. Cough, expectoration, pain in left chest, fever. Rales both apices and bases. Increased involvement of apices. Diagnosed phthisis and so treated. No TBC. Gumma of nose developed. Wassermann positive. Cured with mercury by ingestion.

Case XLIV.—(Covisa [145]). Male, 37. Syphilitic ten years. Cough, malaise, bloody sputum. Treated for phthisis. No TBC. Bone pain developed. Wassermann positive. Cured on specific treatment.

Case XLV.—(Culver [146]). Male, 37. Syphilitic sixteen years. Cough with profuse expectoration in the morning. Hemorrhages. Chills and afternoon fever. Night sweats, weakness, emaciation. Treated as phthisis. No TBC. Gummatous ulcers on legs and tongue. Chest sunken both sides. Involvement of apices. Neosalvarsan intravenously. Cured with mercury injections and KI.

Case XLVI.—(Dieulafoy [Raymond] [58, 88, 143]). Male, 30. Sudden onset of cough, chills, fever, dyspnea, hemoptysis. Involvement of left apex. Primary sore sixteen years ago. No TBC. Complete cure with specific treatment.

Case XLVII.—(Dieulafoy [58, 88, 143]). Male, 32. Cough, heavy green sputum, occasionally blood-streaked. Emaciation, night sweats, pain in chest, weakness. Two foci in left lung. No TBC. Perforation of palate. Admitted chancre eight years previously. Cure with mercury injections.

Case XLVIII.—(Dieulafoy [58, 88, 143]). Male, 33. Syphilitic ten years. Cough, fever, expectoration, weakness, pain in chest.. Involvement both scapular regions. No TBC. Scars of old syphilitic lesions led to diagnosis. Mercurial injection. Cavitation both apices. Complete cure.

Case XLIX.—(Dieulafoy [58, 88, 143]). Male, dyspnea, cough. Diagnosed broncho-pneumonia. Pleural effusion. Tapped with no improvement in dyspnea. Admitted syphilis. Cured with mercury and KI.

Case L.—(Fournier [Legrand] [51, 111]). Male, middle-aged, heredosyphilis. Cough, hemoptysis, emaciation, fever, night sweats. Lesion in middle of lung. No TBC. Cure with specific treatment.

Case LI.—(Gullan [116]). Female, 35. Syphilitic ten years. Cough, hemoptysis, loss of flesh. Gumma left sternocleidomastoid muscle and infiltration of left vocal cord. Involvement of both apices. No TBC. Recovery with specific treatment.

Case LII.—(Hoffman [149]). Male, 21. Cough, weakness, loss of weight, expectoration, dyspnea, fever, night sweats. Penile sore three months previously. Treated for phthisis. Involvement of both lungs, greater in right apex. Wassermann positive. Cured with salvarsan and mercury inunctions.

Case LIII.—(Kayser [141]). Male, 12. Heredosyphilis. Involvement of right upper. Fever, cough, mucopurulent sputum. No TBC. Perforation of hard palate and scars on soft palate. Wassermann positive. Complete cure with mercury rubs. Cure controlled with *x*-ray examinations.

Case LIV.—(Lancereaux [12, 64]). Male, 14 Heredosyphilis. Gumma of palate. Ulcer of pharynx. Dyspnea, cough. Involvement of left base. Cured with mercury rubs and KI.

Case LV.—(Landis and Lewis [151]). Female, 28. Syphilitic. Hemoptysis, loss of weight, cough with profuse greenish expectoration, night sweats, pain over right lung, fever. Involvement of right apex. No TBC. Guinea-pig inoculation negative. Treated for phthisis with no improvement. Wassermann positive. Complete recovery on salvarsan and mixed treatment.

Case LVI.—(Landis and Lewis [151]). Male, 33. Cough with greenish sputum for two years. Pain in right lung, loss of weight, afternoon fever. Anemic. Involvement of right apex. Treated for phthisis at a sanatorium with gain in weight. Symptoms persisted. Blood-streaked sputum. No TBC. Guinea-pig inoculations negative. Wassermann positive. Cured with salvarsan and mixed treatment.

Case LVII.—(Landis and Lewis [151]). Young male. Loss of weight, cough, anemic, afternoon fever, malaise. Involvement of right apex. Treated as phthisis. Osteoperiostitis of sternal end of

clavicle. Wassermann positive. Remained well four years after two doses of salvarsan.

Case LVIII.—(Landrieux [10]). Male, 35. Cough with expectoration. Emaciation. Involvement of both apices. Exostosis of tibia. Chancre some months previously. Cured with specific treatment.

Case LIX.—(Massia [132]). Male, 47. Chancre one year previously followed by many accidents. Cough, diffuse laryngitis, pleurisy, anorexia, fever, night sweats, loss of weight, hoarseness. Involvement of right lower lobe and left apex. No TBC. Impairment of left upper increased. No TBC. Cachexia. Ulcerous syphilid the size of bean on left chest. Cough with vomiting. Extreme dyspnea and painful cough. Cured with KI and mercury rubs. *X*-ray showed lungs clear. Further cutaneous gummata later cured with mercury.

Case LX.—(Massia [Ranjard] [132]). Male, 47. Denied syphilis. Cough, purulent expectoration, hemoptysis, emaciation, night sweats, aphonia, dyspnea. Diagnosed phthisis. Involvement of apices. Coughed up left arytenoid cartilage. No TBC. Cured with specific medication.

Case LXI.—(Milian [114]). Female, 49. Syphilitic six years. Gumma of finger, labia, upper lip, erosive syphilid of tongue, tertiary erythema, enlarged liver, syphilis of right tibiotarsal joint. Weakness, emaciation, dry cough following pleurisy with effusion. Involvement of both apices. Cure with mercury.

Case LXII.—(Zinn [91]). Male, 46. Old syphilitic. Pain in chest. Cough, expectoration. Painful lesions on left shoulder. General nutrition good, leukoderma, adenitis, syphilitic orchitis, cutaneous syphilis. Impairment of right apex. No TBC. Cure with mercury rubs and KI.

Case LXIII.—(Bauch [133]). Male, 51. Fever, cough, pain, loss of weight, weakness, night sweats. Dyspnea, cyanosis. Dulness right lung with cavities. Hypertrophy of left ventricle. Second aortic sound accentuated. *X-ray*: Dense bands of fibrous tissue all over right side. Hilus enlarged both sides. Cavities, adhesions, pneumothorax, bronchiectasis. No TBC. Wassermann positive Guinea-pig inoculations and complement-fixation negative. Five injections of salvarsan with mercurial injections and iodid administration over one and one-half years gave no apparent improvement. Patient comfortably well.

Case LXIV.—(Post [137]). Female. 20. Heredosyphilis. Many stigmata and accidents. Treated in a tuberculosis sanatorium. No TBC. *X*-ray showed extensive involvement of left lung, least marked at apex. Heart displaced to left.

Case LXV.—(Post [137]). Male. Early malignant syphilid four years previously. Cough, emaciation, weakness, expectoration with no TBC. Left lung involved. Iodids given with improvement. Year later increased involvement on left side. Salvarsan administered. Passes for healthy, but gets short of breath easily.

Case LXVI.—(Beriel [120]). *Autopsy on tabetic*: Base of left lung increased in density. Cavities containing pus and caseous material. No tubercles. Newly formed alveoli.

Case LXVII.—(Beriel [120]). Male, 45. Aneurysm of aorta. Left pleura adherent and thickened. Lung practically non-aircontaining. Dilated bronchioles. No TBC. Fibrosis, cellular infiltration, endarteritis and periarteritis.

Case LXVIII.—(Cornil [30]). Male, 2. Heredosyphilis. Almost constant cough and bronchitis since birth. *Autopsy*: White hepatization.

Case LXIX.—(Storch [84]). Female, 29. Syphilitic thirteen years. Nephritis. Ronchi and rales on right. Death. *Autopsy*: Right syphilitic interstitial pneumonia. Cavitation. Cicatrix of pharynx, gumma of bronchial glands, amyloid kidneys, liver, spleen, suprarenals, intestine. Gumma of spleen and liver. Chronic interstitial nephritis. No tuberculosis.

Case LXX.—(Cade et Jambon [104]). Male, 34. Moribund. Pale, emaciated, syphilitic ulcers on legs, scars elsewhere. Respiration accelerated and stertorous. Dulness and large moist rales under right clavicle. *Autopsy*: Right lung smaller and heavier than left. Cavities containing pus. Pleura thickened. Sclerosis. Bronchiectasis. No tuberculosis. Heart enlarged. Interstitial nephritis. Perisplenitis. Syphilitic liver. Amyloid spleen, liver and kidneys.

Case LXXI.—(Cade et Save [109]). Male, 45. Syphilitic eighteen years. Cough with expectoration, weakness, dyspnea, emaciation. No TBC. Tubercular serum test negative. Pleural effusion. Fever and cerebral symptoms. Mercury injections and KI. Death. *Autopsy*: Fluid in left upper thorax. Pus encysted between base of left lung and diaphragm. Left lung heavy. Lower lobe showed sclerosis, white pneumonia, bronchiectasis. Right lung showed areas of white pneumonia. No evidence of tubercle.

Case LXXII.—(Margendorff [56]). Female, 28. Old syphilitic. Long history of accidents and of lung complaint. No TBC. Death. *Autopsy*: Syphilis constitutionalis, interstitial pneumonia, bronchiectasis of superior left lobe, gummata glandularum jugularium retroperitonealium; gumma and cicatrices of liver, amyloid liver, perisplenitis, perihepatitis, syphilitic ulcer of pharynx, left lung pushed back by moderate exudate. Scar at apex. Lung atalectatic. In lower lobe fresh gray-red hepatization. Right lung full of blood and edematous. No tubercle.

Case LXXIII.—(Massia [132]). Male. Dyspnea, involvement of left base. Moist rales over chest. Nummular expectoration. Liver enlarged. Edema of legs. Aortic murmur. Pus in urine. No TBC. Death. *Autopsy*: Seropurulent fluid in left pleural cavity. Cavities in inferior lobe. Bronchiectases containing pus in upper lobe. Fibrosis, hepatization. Right lung showed earlier condition. Syphilitic aorta, ulcer of aorta below diaphragm, calcareous plaques, iliacs rigid at origin. Syphilitic liver, chronic nephritis, perisplenitis.

Case LXXIV.—(Roubier et Bouget [136]). Female. 43. Pain in chest, cough, blood-streaked expectoration, dyspnea, cyanosis. Expectoration of large quantity of material suggesting the opening of an abscess. Emaciation, weakness, anorexia. Large liver, involvement quite general over chest. Pneumothorax. *X*-ray showed marked involvement. Purulent fetid expectoration. No TBC. Death. *Autopsy*: Pus in right thorax, perforations of right lung. Syphilitic pneumonia of right lung with newly formed alveoli. Bronchiectasis, thickening of arteries. Dilatation of bronchus left apex.

Case LXXV.—(Tanaka [137]). Female, 49. Wassermann positive. Diagnosed right sided pulmonary tuberculosis. Death. *Autopsy*: Right lung retracted to half normal size. White pneumonia. Fibrous bands. Purulent bronchitis. No tubercle.

Case LXXVI.—(Duzea [47]). Adult male. Heredosyphilis. Osseous and cutaneous lesions. Cachexia. Hepatic lesions. No lung signs or symptoms. Death. *Autopsy*: Inferior and internal surface

of right lung thickened. Large gumma of inferior lobe. Two others under pleura.

Case LXXVII.—(Fournier [51]). Male, 7. Heredosyphilis. Died of acute intercurrent infection. *Autopsy*: Three small pulmonary gummata.

Case LXXVIII.—(Henop [32]). Male, 18. Primary two years previously. Complained of gastric symptoms and fever. Developed psoriatic syphilid followed by mouth ulcers and condylomata. Relieved with mercury rubs. Developed cough, difficulty in swallowing, mucous sputum. Bed-ridden. Moist rales below right clavicle. Inunctions borne badly. Fever. Pharyngeal ulcer. Rales in right lung increased. Blowing rhonchi at left base. Cerebral symptoms. Dyspnea followed by left-sided pleurisy with effusion. Death. *Autopsy*: In right upper lobe three yellowish white masses and a gumma the size of a goose egg. Lower lobes contained small masses the size of a pigeon egg to that of a pea. Gumma the size of a hen's egg in upper left lobe. Several others throughout the lung.

Case LXXIX.—(Kokawa [113]). Female, 62. Gumma of frontal bone, cutaneous scars. Cough for many years. Ascites, anasarca. Death. *Autopsy*: Cicatrices in larynx, vulva, sclerogummatous liver. Aneurysms of arteries of base of brain. Enlarged spleen. Kidneys small and granular. Right lung contained gummata, one the size of a nut in the middle lobe. Two others near the hilus.

Case LXXX.—(Salomon [98]). Male, 45. Denied syphilis. Complained for two years of gastro-intestinal trouble. Ascites. Large liver. Subcrepitant rales over right base. Death. *Autopsy*: Sclerogummatous liver, sclerogummatous gland about hilus of lungs and extending along smaller bronchi. Pulmonary gummata in both lungs.

Case LXXXI.—(Shingu [129]). Male, 41. Moribund. Lung disease nine months. Death. *Autopsy*: Cherry sized gumma in left upper lobe. In right upper and middle lobes ten cherry-kernel to walnut-sized gummata. In lower lobe three cherry-sized gummata, all sharply circumscribed. Ulceration of false vocal cord. Wassermann positive. No TBC.

Case LXXXII.—(Tanaka [137]). Female, 70. Died of senile dementia and terminal pneumonia. *Autopsy*: Gummatous pneumonia in right lower lobe. Syphilitic liver with icterus. Gumma of spleen and mesaortitis. No tubercle.

Case LXXXIII.—(Tanaka [137]). Male, 34. Gumma of brain. Wassermann positive. Death. *Autopsy*: Gummata of left lower lobe from the size of a walnut to that of a pigeon egg. Bronchitis. No tubercle.

Case LXXXIV.—(Zinn [91]). Female, 28. Old syphilitic. Emaciation, pain in right chest for nine months. Cough, expectoration, fever. Bronchial expiration and crackling rales below right clavicle. Left side, dry rales in infraclavicular fossa. Mucus expectoration. No TBC. Diagnosed pulmonary tuberculosis. Died in delirium *ex anitione*. *Autopsy*: Hazelnut-sized gummata in both lungs. Amyloid spleen, liver, kidneys and intestines.

Case LXXXV.—(Beriel [120]). Female, 28. Miscarriage. Acute broncho-pneumonia followed by hemoptysis. Cough, emaciation, night sweats. Slight obscurity in right apex. Cavity in left. Edema, pain in legs, weakness. Extension to left base, pleural effusion. Hectic fever, sputum so characteristic for tuberculosis that it was not examined for bacilli. Death. *Autopsy*: Left lung adherent to chest wall and diaphragm. Syphilitic pneumonia of lower lobe. Bronchiectatic cavities. Loss of substance. Caseous masses beneath pleura. Upper lobe similar. Sclerous network. Small gummata beneath pleura and in parenchyma of lower lobe. No tubercle. Lymph-nodes of left hilus large, white and firm. Many fragments of lung tissue inoculated into guinea pigs without accident.

Case LXXXVI.—(Brandenburg [121]). Female, 49. Well nourished. Large syphilitic ulcers on left breast and over right scapula and left chest posteriorly. Syphilitic defect in cranium. Scar on labia. Anasarca. Gumma on left forearm. Cough with little sputum. No TBC. Dulness over entire right side. Sudden death from heart failure. *Autopsy*: Syphilitic ulcers of palate, pharynx, and larynx. Heart displaced to right. Miliary elastic gummata of left upper lobe. Lower lobe contained gummata posteriorly and at lower margin. Adherent to diaphragm. Right lung adherent. Contained many scars and a localized area of gangrene. Many elastic gummata. Bronchiectases. Amyloid spleen, adrenals and kidneys. Syphilitic liver. No tubercle.

Case LXXXVII.—(Claytor [105]). Male, 44. Chancre at twenty-three. Previous right hemiplegia. Pain in abdomen, cough with mucopurulent sputum and no TBC. Second aortic sound accentuated. Respiratory sounds harsh. Gumma of sternum. Died of acute parenchymatous nephritis. *Autopsy*: Gumma in left upper lobe. Bronchi contained mucopurulent material. Gumma on inner aspect of right upper lobe. Aortic insufficiency, atheromatous patches, sclerogummatous pancreas. Cirrhosis and amyloid liver. Nephritis and amyloid kidneys. Nodules in lung consisted of dense fibrous tissue with necrotic centers. Bands of connective tissue. Diffuse fibrosis. Arteries thickened. No tubercle.

Case LXXXVIII.—(Balzer [These de Jacquin] [45]). Male, 32. Cough, night sweats, emaciation, hemoptysis, nummular sputum, dyspnea. No traces of syphilis. Involvement of right side posteriorly. Death followed right pleural effusion and laryngeal involvement. *Autopsy*: Fluid in right pleural cavity. Sclerosis of upper lobe. Many caseous masses in lower edge of upper lobe, in middle lobe and at base of lower lobe, the largest subpleural and larger than a hen's egg. All masses surrounded by a fibrous zone. No TBC. Liver sclerogummatous.

Case LXXXIX.—(Councilman [62]). Male. Died of acute endocarditis. *Autopsy*: Well nourished. Signs of syphilis on tibiæ, glans, inguinal glands and aorta. Right lung contained many small caseous gummata in posterior portion of lower lobe. Lower lobe of left lung less affected. Interstitial pneumonia. No TBC.

Case XC.—(Koch, Max [117]). Female, 39. Syphilitic history. Cerebral symptoms, cough, emaciation, cachexia, cyanosis, dyspnea. Impairment right apex. Sputum increased and became foul. No TBC. Dyspnea increased. Death. *Autopsy*: Double-sided chronic pachymeningitis interna hemorrhagica productiva. Right-sided white pneumonia with multiple bronchitis, fibrous peribronchitis and cavities. Gumma in right lower lobe. Syphilitic perforation of soft palate. No TBC. Spirochetes in lung.

Case XCI.—(Lancereaux [22]). Male, 58. Cough, mucopurulent sputum, dyspnea. Died in delirium. *Autopsy*: Syphilitic scars in brain and testicles. Lungs adherent at base to chest wall and dia-

phragm. Cicatrices in lower lobes. In left lower lobe twelve hard gummata. Bronchiectasis. Right lung more advanced.

Case XCII.—(Lancereaux [71]). Male, 58. Brain tumor followed by right hemiplegia. Improved on KI. Cough, mucopurulent expectoration, dyspnea. Loss of vision in left eye. Both bases involved. Eyes failed. Died in delirium. *Autopsy*: Old resolved gumma between lateral ventricles and tumor of optic chiasm. Lungs adherent at base. Cicatrices over surface. Pleura thickened. Right lung most involved. Many small gummata. Fibrosis. Bronchiectasis. Bronchial glands enlarged. Spleen enlarged. Kidneys suggested old gummata. Syphilitic testicles.

Case XCIII.—(Massia [132]). Male, 66. Cough, sputum, dyspnea. Improved and suffered a relapse. Dulness right apex, sibilant rales and ronchi. Signs of diffuse bronchitis. Sputum mucus, adherent. Nodule in left mammary region. Signs of aneurysm of descending aorta. Aortic insufficiency. Later, aortic insufficiency, mitral and aortic stenosis, albuminuria, induration of both apices, greatest on right. Death. *Autopsy*: Fluid in both pleural cavities. Adhesions above. Nut-sized cavities in apex of right lung. Hard infiltration about cavities. Edema elsewhere. Fibrous scars in left apex. Aneurysm of ascending aorta, aortic insufficiency, mitral and tricuspid valves indurated, perisplenitis, chronic nephritis. Bronchiectasis, newly-formed alveoli and epithelium, vascular changes, sclerosis and newly-formed smooth muscle-fibers in lung.

Case XCIV.—(Osler [118]). Male, 27. Hemoptysis, cough, dyspnea. Had been treated as phthisis. Involvement of left apex and extensive involvement of right lower lobe. Diagnosed phthisis, but no TBC in sputum. Died suddenly from hemorrhage from the lung. *Autopsy*: Left apex firm, few scattered nodules on surface. Caseous mass surrounded by scar tissue. Right lower lobe almost entirely solid with caseous masses. Cavity in center. No tubercle or TBC.

Case XCV.—(Pawlinoff [34]). Male, 32. Chancre seven years previously. Cough, expectoration, blood-streaked sputum, cachexia. Involvement of both lungs, greater on right. Death. *Autopsy*: Chronic pneumonia right upper lobe. Peribroncial nodules. Two bronchiectatic cavities. Fibrous bands. Fibrous bands in left upper lobe and upper part of lower lobe. Small gummata in upper lobe.

Case XCVI.—(Peterson [76]). Female, 33. Old syphilitic. Dyspnea, right-sided pleurisy, cough, shortness of breath, attacks of suffocation. Died following tracheotomy which gave no relief. *Autopsy*: Syphilitic stenosis of both bronchi. Interstitial pneumonia. Four gummata of right upper and middle lobe the size of a pigeon's egg. Interstitial hepatitis. No tubercle.

Case XCVII.—(Robertson [133]). Male, 42. Old syphilitic. Cyanosis, anasarca, weakness, dyspnea. Death. *Autopsy*: Aneurysm of aortic arch. Lungs airless except for anterior margins. Five discrete gummata. Typical syphilitic changes. White pneumonia. Newly-formed alveoli with cuboidal epithelium. Changes in blood-vessels. No tubercle. Miliary gumma of pancreas.

Case XCVIII.—(Sugai [127]). Male, 25. Emaciated, cough, expectoration. Little movement of chest on inspiration. Left lung diminished breathing. Right lung sharp breathing in spots. Died of intercurrent disease. *Autopsy*: Upper and lower right lobes contained multiple discrete gummata with necrotic centers. Interstitial pneumonia. Gumma of liver. Amyloid kidneys. No tuberculosis.

Case XCIX.—(Tanaka [137]). Male, 51. Wassermann positive. Moribund. Death. *Autopsy*: Apple-sized gumma in right lower lobe surrounded by cherry-sized nodes. Bronchiectasis. No tuberculosis.

Case C.—(Bruhl et Lyon-Caen [124]). Female, 33. Syphilitic nineteen years. Pulmonary accidents for five years, followed by icterus, tender liver, ascites, collateral circulation, expectoration of bile. Bronchobiliary fistula. Death. *Autopsy*: Syphilitic liver containing three gummata, one in right lobe anteriorly which was adherent to a gummatous diaphragm. Lung bile-stained and contained fibrous bands about dilated bronchi.

Case CI.—(Lancereaux [12]). Male, 56. Emaciation, cachexia, dyspnea, edema of legs. Bronchial breathing right apex. Deformation of liver. Rapid death. *Autopsy*: Depressions throughout right lung. Caseous gummata. Small excavation. No tuberculosis. Base of right lung firmly adherent to diaphragm. Diaphragm thick, fibrous, devoid of muscle-fibers and containing gummatous tumors, many broken down. Right lobe of liver riddled with gummata and cicatrices. Kidneys sclerosed.

Case CII.—(Nacke [93]). Dulness right middle lobe. Large liver and spleen. No fever. No cough or expectoration until very late. Death. *Autopsy*: Caseous gummata occupying right lung, the lower half of middle lobe being gummatous and containing cavities filled with pus. No tubercles. Syphilitic interstitial pneumonia. Gumma of lung and diaphragm. Abscess in adhesions of lung and diaphragm. Gumma of liver. Amyloid spleen. Purulent peritonitis.

Case CIII.—(Sheib [94]). Male, 51. Old syphilitic. Three months previously trauma to stomach region. Pain, anorexia, emaciation, fever, right pleuritis, hemoptysis, dyspnea and sudden death. *Autopsy*: Both lungs peppered with gummata varying in size up to that of a hen's egg. No tubercle. Gummata of stomach, intestine and mesenteric lymph-nodes. Scars of gummata on skin.

Case CIV.—(Delepine and Sisley [63]). Male, 43. Syphilitic twenty-five years. Several accidents. Dulness on right commencing at upper border of fifth rib. Liver and spleen enlarged. Bronchitis and epistaxis. Developed ulcer on left leg. Rupial eruption appeared over left leg while under observation. Death from erysipelas. *Autopsy*: Syphilitic changes in lower lobe of left lung. Right lobe similar. Completely adherent to diaphragm which was displaced upward and partly destroyed by an extension into its substance of a large gumma of the liver. Gumma of spleen. Gummatous interstitial myositis of diaphragm. General adenitis.

Case CV.—(Galvagni [100]). Female, 37. Syphilitic. Emaciation, cough with purulent sputum, occasionally containing elastic tissue, occasionally blood-streaked. No TBC. Dry and moist rales. Diminished breathing at bases. Ascites. Large tumor of abdomen. Surface veins enlarged. Death. *Autopsy*: Kidneys fibroid. Abdominal lymph-glands, large and hard. Spleen fibrous. Enormous gumma of liver. Posteriorly a smaller caseous gumma which extended through the diaphragm and invaded the entire right lower lobe of the lung.

Case CVI.—(Stengel [102]). Large male. Death. *Autopsy*: Right lung attached to posterior wall of

thorax by a gumma which invaded lung, bodies of vertebræ and ribs. Bodies of vertebræ and ribs somewhat necrotic. Peribronchial and perivascular tissues completely converted into neoplasm. Bronchus compressed.

Case CVII.—(Fournier [51]). Male child. Heredosyphilis. While being treated for bone syphilis, died of diphtheria. *Autopsy*: Pulmonary gumma.

Case CVIII.—(Rolleston [67]). Male, 28. Syphilitic six years. Several accidents. Died of uremia. *Autopsy*: Thickened pleura over upper part of lower right lobe posteriorly. Corresponding to this an area of lung tissue markedly fibrosed. Meshwork of thick bands. In center of fibrosed portion is a caseous mass as big as a marble. No tubercle. Gummata of liver, amyloid kidneys, suprarenals, intestines, spleen and liver.

Case CIX.—(Fowler [125]). Male, 38. Cough, expectoration, left-sided pleurisy. Night-sweats and dyspnea. Treated for syphilitic tracheal stenosis and bronchitis. Cicatrix of soft palate. No TBC. Well. Expectorated large quantity of offensive purulent material for two days. Cough severe. Brought up quart of blood-stained sputum. Increased dyspnea, prostration, headache, slight delirium. No loss of weight. Stridor. Involvement of both lungs. Expectoration profuse and difficult to expel. Death. *Autopsy*: Scars on tongue, glans, scrotum. Thickening of right tibia. Trachea narrowed. Scarred bronchi. Black fibroid mass in upper lobe of right lung with radiations into surrounding tissue. Left upper lobe contracted. Contained no normal tissue. Bronchiectasis. Gumma. No tuberculosis. Liver scarred. Spleen contained calcareous masses. Testes fibroid.

Case CX.—(Fowler [125]). Male, 36. Chancre at 18. Cough and expectoration for three years. Enlarged glands in neck. Involvement of right apex. Large quantities of fetid pus. Developed absolute dulness over right side. Sputum frothy, greenish, nummular. No TBC. Signs of cavity. Death from hemorrhage in attempt to drain. *Autopsy*: Old and recent syphilitic scars of trachea with stenosis of bronchi. Bronchi of right lung dilated. At base of upper lobe two large cavities communicating with bronchi. Cavity in anterior part of lower lobe. Lung puckered in many places. Fibrous throughout. Gummata and cicatrices of liver. Amyloid kidneys and liver.

Case CXI.—(Fowler [125]). Male, 59. Chancre thirty-four years previously. Many accidents. Dry cough for four years. Paroxysmal cough with offensive mucopurulent expectoration. Emaciation. Involvement of both lungs with signs of cavity. No TBC. Death. *Autopsy*: Right apex consolidated. Lower part contained cavity communicating with main bronchus. Below this lung almost solid. Few small cavities with curdy contents. Left upper lobe nodular. Cavity from bronchial dilatation posteriorly. In lower lobe numerous encapsulated caseous masses. Testes fibrous. Gumma in kidney.

Case CXII.—(Massia [Hedron] [132]). Female, 44. Old syphilitic with many accidents. Several years previously chronic pneumonia of right side diagnosed and treated as phthisis but no bacilli were ever found in many examinations. Sputum scanty. Both lungs became involved. Died of broken compensation following mitral insufficiency. *Autopsy*: Left lung harder than normal. Right lung hard and atrophied. Dense fibrous masses at hilus and about vessels. Fibroid pleurisy. Cavities in middle of upper lobe communicating with bronchi. Bronchiectasis. Spleen enlarged. Liver syphilitic. Scars of cutaneous gummata. No TBC microscopically. No spirochetes. Guinea pigs inoculated with lung tissue developed no accidents.

Case CXIII.—(Massia [Letulle et L. Nattan-Larrier] [132]). Male, 67. Syphilitic twenty-five years. Died of chronic nephritis and chronic aortitis. *Autopsy*: In right lung, superficial deforming scars, ampular emphysema and bronchiolectasis. Sclerosis, fibrous bands containing newly formed smooth muscle-fibers. Emphysematous cavities lined with vegetating epithelium.

Case CXIV.—(Councilman [62]). Female, 43. Shortness of breath for two years, cough, edema of legs, dulness posterior portion of lungs. Liquid rales. Died of nephritis. *Autopsy*: Syphilitic liver. Amyloid spleen and kidneys. Depressions at base of right lung. Pleura thickened. Fibrous bands running to center of lung. Alveoli atrophic. Dense masses of connective tissue along bronchi and great vessels. Bronchi dilated. Caseous nodules, surrounded by connective tissue. Walls of alveoli thickened. Left lung similar to right. Endarteritis. No TBC.

Case CXV.—(Vidal de Cassis [3]). Female, 45. Dyspnea on exertion. No lung complaint until a month previously. Chancre thirteen years previously. Scars of ecthyma and rupial syphilid. Not emaciated. Patient died of suffocation. *Autopsy*: In posterior portions of inferior lobes of both lungs the bronchial ramifications were surrounded by an indurated mass which had replaced the parenchyma of the lung.

Case CXVI.—(Tanaka [137]). Male, 53. *Autopsy*; Aneurysm of ascending aorta. Hemorrhagic bronchitis. Upper and lower lobes of right lung showed thick fibrous bands, sometimes in the interstitial tissue, other times in the parenchyma. No tubercle.

Case CXVII.—(Lisser [178]). Female, 22. Specific iritis two and half years previously. Cold six weeks previously, fever, chills, continuous cough, abundant thick yellow bloody sputum, night-sweats, anorexia, weak, dyspnea, pleuritic pains. Looked ill, fever. Excursion limited, apices dull, bronchial breathing, coarse bubbling rales, friction rub in axillæ. Repeatedly no TBC. *X*-ray showed marked involvement of right cardiohepatic angle. Wassermann positive. Well and gained 15 pounds on antiluetic treatment. *X*-ray picture cleared up.

Case CXVIII.—(Funk [188]). Female, 40. Ill from six to seven years. Once in tuberculosis sanatorium. Previously desultory anti-syphilitic treatment. Pains throughout body and in lower right chest. Slight nonproductive cough. Fever, tired easily. Impairment over lower portion of right chest posteriorly and diminished breath. Wassermann positive. *X*-ray, peribronchial thickening more marked in right lower. Prompt improvement on intensive antiluetic treatment. *X*-ray picture improved.

Case CXIX.—(Funk [188]). Colored female, 27. Diagnosed advanced tuberculosis with laryngeal involvement. Cough gradually worse for two years. Purulent and blood-tinged sputum. Many small hemoptyses for two weeks, weak, emaciated. Had been treated for a year as tuberculous. Fever. Sputum repeatedly negative for TBC. Laryngologist reported laryngeal ulceration appeared leutic. Wassermann strongly positive. *X*-ray showed bilateral disease. Rapid cure on antiluetic treatment. Well and working four years later.

Case CXX.—(Funk [188]). Male, 30. Cough, ex-

pectoration, weakness, emaciation. Syphilitic testicle removed a year previously. Diagnosed pulmonary tuberculosis and advised to go to a sanatorium. Limited expansion of bases, impaired resonance, distant breathing. Coarse rales in right side below third rib in front and spine of scapula behind. Slight clubbing of fingers. Repeatedly negative TBC. Wassermann positive. X-ray, infiltration in lower border of upper right lobe and possibly upper portion of middle lobe. In right lower lobe considerable fibrous tissue and few small cavities, probably bronchiectatic. No tuberculosis. Intensive antiluetic treatment. Well and working.

BIBLIOGRAPHY

The following, while not a complete bibliography of syphilis of the lung, represents the material upon which we have based this article. Citations marked thus (*) represent those from which we have abstracted cases.

Previous to 1890

1. Fuhrer: *Deutsch. Klin.*, 1854, vi, 272.
2. Ch. Robin Et Lorrain: Note sur l'epithelioma du foetus. *Gaz. med. de Paris*, 1855, 3rd series, x, 186.
3. *Vidal de Cassis: Traite des mal. vener., 1855, 2*nd Ed.*
4. Virchow: Ueber die Natur der Constitutionell-syphilitischen Affectionen. *Virchow's Archiv.*, 1858, xv, 310.
5. Wilks: Specimens of disease of the lung, etc., supposed to be syphilitic. *Trans. Path. Soc.*, 1858, ix, 55.
6. Wagner: Das Syphilom der Respirationsorgane. *Archiv der Heilkunde*, 1863, iv, 356.
7. Weber: Syphilitic disease of the liver, lungs, etc. *Trans. Path. Soc.*, 1866, xvii, 152.
8. *Dufour: L'Union Medicale, 1868, v, 798.
9. Moxon: A contribution to the history of visceral syphilis. *Guy's Hosp. Reports*, 1868, xiii, 329.
10. *Landrieux: Pneumopathies syphilitique. *These de Paris*, 1872.
11. Hertz: *Virchow's Archiv.*, 1873, xlii, 421.
12. *Lancereaux: Traite pratique et historique de la syphilis, 1873, pp. 203, 257, 272, 322.
13. Goodhart: Syphilitic disease of the lung. *Trans. Path. Soc.*, 1874, p. 31.
14. *Fournier: De la Phthisie Syphilitique. *Gaz. hebd. de Med. et de Chirurgie*, 1875, xlii, 758, 773, 802.
15. Grandidier: Ueber Lungensyphilis und ihre Heilbarkeit durch die Schwefelquellen zu Nenndorf. *Berl. Klin. Worchenschr.*, 1875, xlii, 195.
16. Greenfield: *Trans. Path. Soc.*, 1876, xxvii, 43.
17. Goodhart: Phthisis of fibroid form. History of syphilis. *Trans. Path. Soc.*, 1877, p. 313.
18. Gowers: Syphilitic disease of the lungs. *Trans. Path. Soc.*, 1877, p. 336.
19. Green: Syphilitic disease of the lung. *Trans. Path. Soc.*, 1877, p. 331.
20. Greenfield: Visceral syphilis. *Trans. Path. Soc.*, 1877, xxviii, 249.
21. Irvine: Double Aneurysm of thoracic aorta, etc. Interstitial Pneumonia. *Trans. Path. Soc.*, 1877, xxviii, p. 63.
22. *Lancereaux: *Gaz. des Hopitaux*, 1877, pp. 989-993.
23. Pye-Smith: Tertiary syphilis of the lung, etc. *Trans. Path. Soc.*, 1877, p. 334.
24. Tiffany: Syphilis of the lung. *Am. Journ. of the Med. Sciences*, 1877, ixxiv, 90.
25. *Fournier: Phagedenesme III du Pied, phthisie syphilitique. *Anal. d. Derm. et de Syphilitique*, 1878; also *Bulletin de l'Academie de med.*, Nov. 19, 1878.
26. *Poterin Du Motel: Sur la tuberculose syphilitique. *Union Medical*, 1878, p. 864.
27. Ramdohr: Zur Casuistik der lungensyphilis bei erwachsenen. *Arch. der Heilk.*, 1878, p. 410, xix.
28. Vierling: Syphilis der trachea und der bronchien. *Deutsch. Archiv fur Klinische Med.*, 1878, xxi, 325.
29. Beirger: Trachealsyphilis. *Deut. Arch. f. Klin. Med.*, 1879, xxiii, 608, 614, 618.
30. *Cornil: Traite de la syphilis, 1879.
31. Cougenheim: *Soc. Med. des Hop.*, 1879, xvi, 150; *Gaz. des Hop.*, 1879, p. 438.
32. *Henop: Ein fall von luetischen erkrankung der lungen. *Deut. Arch. f. Klin. Med.*, 1879, xxiv, 250.
33. Irvine: *Trans. Path. Soc.*, 1879, xxx, 239.
34. *Pawlinoff: Diagnose und behandlung der lungensyphilis. *Virchow's Archiv.*, 1879, lxxv, 162.
35. Schnitzler: Ueber lungensyphilis und ihr verhaltnis zur lungenschwindsucht. *Wiener Med. Presse*, 1879, Nos. 11, 14, 15, 19, 21, 27, 32, 34, 35, 38, 41.
36. *Cube: Ein beitrage zur lungensyphilis. *Virch. Arch.*, 1880, lxxxii, 516.
37. *Lancereaux: *Gaz. des Hopitaux*, x, Dec., 1881.
38. *Lutz: Lungen und rukenmarks syphilis. *Arztl. Intelligenzblatt*, 1881, xxviii, 543.
39. Pancritius: Ueber die lungen syphilis, Berlin, 1881.
40. *Schech: Lungen und trachealsyphilis caussistische beitrag. *Deutsch. Arch. f. klin. Med.*, 1882, iii, 410.
41. *Engel: The diagnosis of pulmonary syphilis, etc. *Phila. Med. Times*, 1883, xiii, 4.
42. Sokolowski: Ueber die luetische phthise. *Deut. med. Woch.*, 1883, ix, 539, 552, etc.
43. *Dubousquet-Laborderie et E. Gauchiers Syphilis hereditaire tardive. Phthisie Pulmonaire Syphilitique Guerie. *Revue de Med.*, 1884, iv, 663.
44. Hiller: Ueber lungensyphilis und syphilitische phthisis. *Charite Annalen*, 1884, ix, 184.
45. *Jacquin: Phthisie syphilitique chez l'adulte. *These de Paris*, 1884.
46. Kroeniger: Beabachtungen uber den befund des auswurfe bei syphilitika lungenerkrankung. *Deutsch med. Woch.*, 1884, x, 816.
47. *Duzea: Sur un cas de syphilis probablement hereditaire. *Lyon Medical*, 1885, lix, 228.
48. *Gaudichier: Phthisie syphilitique-guerison. *Annales de dermat. et de syphilogrophie*, 1885, 2nd series, vi, 152.
49. Porter: Phthisis and pneumonia in their relation to syphilis. *N. Y. Med. Journ.*, 1885, xlii, 114.
50. Potain: *Journ. de Med. et de Chir. Pratique*, 1885, p. 15.
51. (*a*) *Fournaer: Syphilis hereditaire tardive. *Paris*, 1886, p. 418.
(*b*) Kidd: Diffuse symmetrical pulmonary cirrhosis. *Trans. Path. Soc.*, 1886, xxxvii, 126.

52. Symonds: A case of syphilitic hepatitis and of interstitial pneumonia in an infant. *Trans. Path. Soc. of London*, 1886, xxxvii, 124.
53. Schech: Beitrage zur lehre von der syphilis der lunge, etc. *Internationale Klin. Rundschau, Wien*, 1887, i, Nr. 5.
54. Ziemssen: Lungentuberculosè-syphilis oder carcinom. *Berlin klin. Woch.*, 1887.
55. Mauriac: Syphilis tertiaire des poumons. *Gaz. des Hop.*, 1888, p. 414.
56. Potain: Syphilis et tuberculose, *Gaz. des Hop.*, 1888, No. 137, 142.
57. Ruhemann: Ueber lungensyphilis. *Berlin*, 1888.
58. *Dieulafoy: Syph. du. poumon et de la plevre. *Gaz. hebd. de Med.*, 1889, 2nd series, xxvi, 285, 303, 317, 331, 348, 367.
59. *Margendorff: Ueber lungensyphilis. *Inaug. Diss.*, Berlin, 1889.

1890

60. MacDonald: Pulmo-biliary fistula, probably due to syphilis; recovery. *The Lancet*, 1890, ii, 973.
61. Mauriac: Syphilis tertiare et syphilis hereditaire. 1890, p. 436.

1891

62. *Councilman, J. H.: *Bull.*, Feb.—Mar., 1891, No. 11, p. 34.
63. *Delepine & Sisley: Extensive gummatous lesions of the liver, diaphragm, lung, and spleen, *Trans. Path. Soc.*, 1891, xlii, 141.
64. *Lancereaux: La syphilis hereditaire des poumons. *L'Union medicale*, 1891, li, 365.
65. *Panas: Gommes syphilitiques de l'oeil et du poumon simulant la tuberculose. *Medicine Moderne*, 5 fevrier, 1891.
66. Perry, E. C.: Diffuse syphilitic fibrosis of the lungs. *Trans. Path. Soc.*, 1891, xlii, 53.
67. *Rolleston, H. D.: *Trans. Path. Soc.*, 1891, xlii, 50.
68. Satterthwaite: .Pulmonary syphilis in the adult. *Boston Med. and Surg. Journal*, 1891, cxxiv, 573-583, 600.
69. Wright: Tracheal syphilis. *N. Y. Med. Journ.*, 1891, liii, 672.

1892

70. Hodenpyl: Miliary tuberculosis and gummata occurring in the same lung; their differential diagnosis. *Med. Record*, 1892, xlii, 659.
71 *Lancereaux: *Clinique medicale*, 1892, p. 244.
72. Marfan: Syphilis du poumon. *Gaz. des Hopit.*, 1892, p. 29.

1893

73. Abrams: Report of a case of lung syphilis with autopsy. *Occident. Med. Times*, 1893, vii, 363.
74. *Feulard: *Soc. de dermat. et de syphilographie*, Seance du 18 mai, 1893.
75. *Jullien: Diagnostic et traitement de la syphilitis pulmonaire. *L'Union Med.*, 1893, lv, 565.
76. *Peterson: Zur kenntnis der lungensyphilis. *Munch. med. Woch.*, 1893, xl, 725.
77. *Thompson: Gumma of the lung. *Medical Record*, 1893, xliv, 522.

1894

78. Hochsinger: Syphilis congenita und tuberculose. *Wien. Med. Blatter*, 1894, xvii, 255.

1895

79. Jacquinet: Tuberculose pulmonaire chez les syphilitiques. *These de Paris*, 1895.
80. Potain: *Semaine medicale*, 6 fevrier, 1895.
81. Tandoff: *Annales de Derm. et de Syph.*, 1895, p. 707.

1896

82. Bourdieu: *These de Paris*, 1866.
83. Neumann: *In Nothnagel's spec. Path. u. Therap.*, 1896, xxiii.
84. *Storch: Beitrag zur syphilis der lunge. *Bibliotheca medica*, Abth. C., Heft 8, 1896.

1897

85. Langovoi: *Annales de Derm. et de Syph.*, 1897, p. 696.

1898

86. Borst: Uber die gegenseitige beinflussung von syphilis und tuberculose. *Munch. med. Woch.*, 1898, xlv, 981.
87. Chretien: De l'influence reciproque des etats morbides et en particulier de la syphilis et de la tuberculose. *La Semaine medicale*, 1898, xviii, 89.
88. *Dieulafoy: Clinique medicale de l'hotel dieu de Paris, 1897-1898, p. 355.
89. Hansemann: Die secundare infection mit tuberkelbacillen. *Berl. klin. Woch.*, 1898, xxxv, 233.
90. *Levy: *Deutsche Derm. Gesellschaft*, VI *Congress*, May-June, 1898.
91. *Zinn: Ueber lungensyphilis. *Charite Annalen*, 1898, xxiii, 236.

1899

92. Flockemann: Neuere arbeiten uber lungensyphilis. *Centralblatt f. Allgemeine Path.*, 1899, x, 449.
93 *Nacke: *Cited by Flockemann.*

1900

94. *Sheib: Syphilis mit gummoser affection des magens und dormes sowie der lungen bei einem 51 jahrigen Manne. *Prager med. Woch.*, 1900, xxv, 537, 551.

1901

95. Hansemann: Uber lungensyphilis. *Verhandlungen des* 19 *kongresses f. innere Medizin*, 1901, p. 563.

1902

96. Berg: Pulmonary syphilis simulating pulmonary tuberculosis. *Medical Record*, 1902, lxii, 926.
97. Dawson: Fibrosis of lung, probably syphilitic. *Trans. Med. Soc.*, London, 1902, xxv, 351.
98. *Salomon: *Soc. Anat.*, 1902, p. 901.

1903

99. Conner: Syphilis of trachea and bronchi, etc. *Am. Journ. Med. Sc.*, 1903, cxxvi, 957.
100. *Galvagni: Cited by Boix, *Arch. gen. de. Med.*, 1903, cxci, 1314.

1904

101. Baumel: Syphilis pulmonaire. *Gaz. des Hopitaux*, 1904.
102. *Stengel: Syphilis of the lungs simulating pulmonary tuberculosis. *Univ. Penna. Med. Bull.*, 1903-1904, xvi, p. 89.
103. Tripier: *Traite d'anatomie pathologique generale*, 1904.

1905

104. *Cade et Jambon: Sur les lesions broncho-pulmonaires de la syphilis tertiare. *Arch. de Med. Experim. et d'anat. Path.*, 1905, xvii, 649.
105. *Claytor: Syphilis of the lung. *Am. Journ. Med. Sc.*, 1905, cxxix, 563.
106. Hughes and Willson: Syphilis of the lung simulating phthisis. *Med. News*, 1905 cxxxvi, 351.
107. Sergent: Syphilis et tuberculose. *Arch. Gen. de Med.*, 1905, cxevi, 2497.
108. Spitzer: Uber spirochatenbefunde im syphilitischen gewebe. *Wien. klin. Woch.*, 1905, No. 31.

1906

109. *Cade et Savy: Syphilis et dilatation bronchique. *Soc. Med. des Hop. de Lyon*, Jan. 30, 1906; *Lyon medicale*, 1906, cvi, 345.
110. Doutrelepont U. Grouven: Ueber den nachweis von spirochæta pallida in tertiar-syphilitischen produkten. *Deutsche med. Woch.*, 1906, xxxii, 909.
111. *Fournier: Traite de la syphilis. Paris. 1906, ii, 710.
112. Herxheimer: Zur pathologischen anatomie der syphilis. *Lubarsch-Ostertage Ergebn. d. allg. Path.*, 11th Jarhg., 1 Abt., 1906, p. 247.
113. *Kokawa: Lungengummata. *Archiv. f. Derm. u. Syph.*, 1906, lxxviii, 319.
114. *Milian: Article syphilis du poumon; Fournier's traite de la syphilis. Paris, 1906.

1907

115. *Buchanan: Syphilis of the lung. *British Medical Journal*, 1907, i, 318.
116. *Gullan: Syphilis of the lung. *British Med. Journal*, 1907, i, 318.
117. *Koch, M.: Uber einen spirochatenbefund bei kavernoser lungensyphilis und pachymeningitis haemorrhagica interna productiva. *Verh. d. D. Path. Ges.*, 2 Tag, 1907, p. 275.
118. *Osler: Modern medicine. Lea Bros. and Co., Phila., 1907, iii, p. 471.
119. Schmorl: *Verh. d. Deutsch. Path. Geselsch.*, 1907, 2 Tage, ii, p. 281.

1908

120 *Beriel: La syphilis du poumon. 1908.
121. *Brandenburg: Ein beitrag zur lungensyphilis. *Beitrag. zur Klin. der Tuberculose*, 1908, x, 182.
122. *Henske: Syphilitic lobar pneumonia. *Medical Fortnightly*, 1908, xxxiii, 243.
123. Sergent: Evolution et traitement de la tuberculose chez les syphilitiques. *La Presse medicale*, 1908, xvi, 657.

1909

124. *Bruhl et Lyon-Caen: Foie syphilitique avec fistule bronchobiliare. *Bull. Societe Anatomique de Paris*, 1909, 6th series, ii, 381.
125 *Fowler: Syphilitic disease of the lung. *Albutt's Syst. of Med.*, 1909, v, 420.
126. Ribadeau, Dumas et Ameuille: Pneumonie blanche et tuberculose. *Bull. Soc. Anat. de Paris*, 1909, 6th series xi, 545.
127. *Sugai: Ein fall von lungensyphilis beim erwachsenen. *Centralbl. fur allg. Pathol.*, 1909, xx, 193.

1910

128. *Grindon: Pulmonary syphilis at an unusual site. *Journ. of Cutan. diseases*, 1910, xxviii, 288.
129. *Shingu: Zur pathologischen anatomie mulipler lungengummen. *Wiener klin. Woch.*, 1910, xxiii, 971.

1911

130. Forsyth: Gumma of the lung. *Proceedings of Royal Society of Medicine, Sect. for Study of Diseases of Children*, 1911-1912, v, 186.
131. Hansemann: Ungewohnlicher fall von lungensyphilis. *Berlin. klin. Wochen.*, 1911, xlviii, 67.
132. *Massia: Le poumon syphilitique; contribution a l'etude de la syphilis poumonaire chez l'adulte. *Th. Lyon*, 1910-1911.
133. *Robertson: Syphilis of the lungs with report of a case *Journ. of Path. and Bacteriology*, 1910-1911, xv, 45.

1912

134. Denker: Ueber bronchoskopisch diagnostizierte tracheobronchial und lungensyphilis. *Deutsch. med. Woch.*, No. 1, 1912, p. 11.
135. French: Syphilitic lung affections and immunity in native races. *The Lancet*, 1912, ii, 227.
136. *Roubier and Bouget: Pyopneumathorax dans la syphilis pulmonaire. *Revue de Med.*, 1912, xxxii, 185.
137. *Tanaka: Beitrage zur kenntniss der lungensyphilis beim erwachsenen. *Virchow's Archiv.*, 1912, ccviii, 429.

1913

138. *Roussel: Pulmonary syphilis. *N. Y. Med. Journ.*, 1913, xcviii, 600.

1914

139. *Blinder: Syph. of the lungs simulating pulmonary tuberculosis. *Med. Record*, 1914, lxxxvi, 330.

140. *Brown: Some errors in the diagnosis of pulmonary tuberculosis. *J. H. Bull.*, 1914, xxv, 112.
141. *Burnham: Syphilis of the lung. *Boston Med. and Surg. Journal*, 1914, clxxi, 411.
142. *Colleville: Sur un cas de gomme syphilitique pulmonaire. *La Clinique*, Bruxelles, 1914, xxviii, 353; *Union Med. du Nord Est.*, 1914, xxxviii, 95.
143. *Dieulafoy: A text book of medicine. *Appleton & Co., N. Y.*, 1914, i, 231.
144. *Kayser: Roentgenglogischen beitrag zur klinik der lungensyphilis. *Fortschritte auf dem Gebiete der Roentgenstrahlen*, 1914, xxii, 214.

1915

145. *Covisa: Syphilis der lunge. *Derm. Woch.*, 1915, xl, 81.
146. *Culver: An instance of pulmonary syphilis closely simulating tuberculosis. *J. A. M. A.*, 1915, xliv, 335.
147. Downing: Syphilis and lung disease. *Boston Med. and Surg. Journ.*, 1915, clxxii, 898.
148. Easton: Syphilis of the lung. *Med. Rec.*, 1915, lxxxviii, 652.
149. *Hoffman: Syphilis of the lung. Report of Case. *Ky. Med. Journ.*, 1915, xiii, 197.
150. Hollman: Pulmonary syphilis. *Urolog. and Cut. Review*, 1915, xix, 181.
151. *Landis and Lewis: Latent syphilitic infections of the lungs. *Am. Journ. Med. Sciences*, 1915, cl, 195.
152. Levin: A case of hemoptysis, evidently of syphilitic origin. *N. Orl. M. & S. J.*, 1915-1916, lxviii, 396.

1916

153. *Bauch: A report of two cases of syphilis of the lung. *Med. Rec.*, 1916, lxxxix, 906.
154. Hays: Syphilis of the lungs. *Laryngoscope*, St. Louis, 1916, xxvi, 190.
155. Keilty: Syphilis and tuberculosis in the same lung. *N. Y. M. J.*, 1916, civ, 252.
156. *Perret: Pulmonary syphilis; report of a case. *N. Orl. M. & S. J.*, 1916-1917, lxix, 191.
157. *Post: Two cases of syphilis of the lung. *Bost. Med. & S. Jour.*, 1916, clxxiv, 876.
158. Potter: Salvarsan in the treatment of double infections, tuberculosis and syphilis. *Am. Jour. Med. Sc.*, 1916, clii, 823.
159. Wilmans: Lungentuberkulose oder lungensyphilis? *Munchen. med. Woch.*, 1916, lxiii. 1481.
160. Wood: Syphilis of the lungs. *Bost. M. & S. Journ.*, 1916, clxxv, 677.

1917

161. Castex and Denis: Sifilis pulmonar. *Prensa Med.*, Argentina, Buenos Aires, 1917, iii, 398.
162. Castex: Gangrena en una Sifilis pulmonar. *Prensa Med.*, Argentina, Buenos Aires, 1917, iv, Supl. 7, pp. 23-26.
163. Boudet: Trois observations de syphilis du poumon a forme subaigne: valeur de l'expectoration hemoptoique. *Paris Med.*, 1917, xxi, 495-498.
164. Dexter: Pulmonary syphilis. Report of a case. *Cleveland Med. Journal*, 1917, xvi, 147.
165. Keilty: Syphilis and tuberculosis in the same lung. *Proc. Path. Soc.*, Phila., (1916) 1917, xxxvii, 25.
166. Leredde: Etude sur une forme ignoree de syphilis pulmonaire (emphyseme, asthme et syphilis). *Paris Med.*, 1917, xx, 225-233.
167. Phipps: Pulmonary syphilis; with report of a probable case. *Bost. M. & S. J.*, 1917, clxxvi, 390-392.
168. Tice: Luetic infection of the lungs, pathology of syphilis of the respiratory tract. *Med. Clin.*, Chicago, 1917, ii, 1253-1264.
169. Warthin: Syphilitic aneurysm of the pulmonary artery, with demonstration of the spirochete. *Am. Jour. Syphilis*, Oct., 1917, i, No. 4, p. 693.
170. Watkins: The roentgen diagnosis of lung syphilis. *Am. J. Syph.*, St. Louis, 1917, i, 760-766.
171. Withierspoon: A case of syphilis of the lung, with results of treatment as shown by the *x*-ray and physical signs. *J. Tenn. M. Assn.*, Nashville, 1916-1917, ix, 435-440.

1918

172. Barlaro: Sobre la sifilis del pulmon. *Prensa Med.*, Argentina, Buenos Aires, 1918-1919, v, 8-10.
173. Carman: A review of the roentgenology of syphilis. *Am. Jour. Syph.*, April, 1918, ii, 325.
174. Castex and Queirel: Gangrena en una neumopatia sifilitica (observacion anatomoclinica). *Prensa Med.*, Argentina, Buenos Aires, 1917-1918, iv, 355-362.
175. Davidson and Callaway: A case of syphilis of the lung. *U. S. Nav. M. Bull.*, Wash., 1918, xii, 266.
176. Hall: A case of gumma of the entire left lung. *Lancet*, Lond., 1918, ii, 779.
177. Hoxie: Syphilitic pneumonia. *Southwest J. M. & S.*, El Reno, 1918, xxvi, 169-175.
178. *Lisser: Syphilis of the lung. *Am. J. M. Sc.*, Phila., 1918, clv, 356-380.
179. Morris, Jr.: Pulmonary syphilis. *Med. & Surg.*, St. Louis, 1917-1918, i, 949-958, also Syphilis of the lungs. *Am. J. Syph.*, St. Louis, ii, 231-236.
180. Orszag: Ueber einen geheilten fall von parenchymatitis luetica. (Brauer). *Beitr. z. Klin. d. Tuberk.*, Wurzb., 1918, xxxix, 141-144.
181. Plicque: La syphilis broncho-pulmonaire. formes et traitement. *J. de Med. et chir. prat.*, Par., 1918, lxxxix, 321-326.
182. Rossle: Ueber die lungensyphilis der erwachsenen. *Med. klin.*, Berl., 1918, xiv, 750; also *Deutsche Med. Wchnschr.*, Leipsic u. Berlin, 1918, xliv, 1040; also *Berl. Klin. Wchnschr.*, 1918, lv, 962.
183. Rothschild: Ueber die diagnose der lungensyphilis im zweiten stadium der lues. *Med. Klin.*, Berl., 1918, lxv, 1199; also *Munchen* med. Wchnschr., 1918, lxv, 1199; also Ueber die diagnose der lungensyphilis durch nachweis der spirochaeta pallida in Auswurf und veranderungen des lungenbildes in roentgenogramm. *Munchen med. Wchnschr.*, 1919, lxvi, 195.
184. Schonfeld: Ueber die roentgendiagnose bei lungensyphilis. *Med. Klin.*, Berl. 1918, xiv, 847.

185. Warthin: The new pathology of syphilis (reprint). *Am. J. Syph.*, July, 1918, ii, No. 3.
186. Weber: Syphilitic disease of the lungs in adults. *Clin. J.*, Lond., 1918, xlvii, 19-25.
187. Withierspoon: Syphilis of the lung. *South. M. J.*, Birmingham, 1918, ii, 274-278.

1919

188. *Funk: Pulmonary syphilis. *Am. Rev. Tubere.*, Balt., 1919-20, iii, 754-762; also *Penn. M. J.*, Athens, 1919-20, xxiii, 310-315.
189. Groedel: Kardiale stauung oder lungensyphilis? Ein beitrag zur roentgendiagnostik der lungensyphilis. *Munchen med. Wchnschr.*, 1919, lxvi, 318.
190. Kayser: Ueber den gegenwartigen stand unserer kenntnisse von der lungensyphilis der erwachsenen. *Berl. klin. Wchnschr.*, 1919, lvi, 733.

1920

191. Apert, Gerard and Michel: Syphilis pulmonaire chez un enfant de trois ans. *Bull. et mem. Soc. anat. de Par.*, 1914-19, lxxxix, 497-499.
192. Boislineire: Syphilis. Reaction of lung. *Am. J. Syph.*, July, 1920, iv, 466.
193. Carrera: A pathologic study of the lungs in one hundred fifty-two autopsy cases of syphilis. *Am. J. Syph.*, St. Louis, 1920, iv, 1-33.
194. Watkins: X-ray characteristics of lung syphilis. *J. Radiol.*, May, 1920, i, 297.

EVIDENCES OF THE FUNCTION FROM THE PATHOLOGY OF THE KIDNEY TUBULE

BY LOUIS A. TURLEY, A.B., M.D., F.A.C.P.

Assistant Dean, and Professor of Pathology, School of Medicine, University of Oklahoma. Pathologist to St. Anthony's Hospital,

Oklahoma City, Oklahoma.

THERE is not one of the vital organs, the exact anatomy of which so little is known and the physiology of which is the subject of more speculation and so little real knowledge as is the case in regard to the kidney. As an evidence of this let me remind you that there are very few textbooks on anatomy and physiology which discuss the anatomy of the kidney with any degree of accuracy, and the illustrations accompanying the discussions are in no case those of a normal kidney, and in most cases these illustrations are incorrectly labelled. And so far as the physiology is concerned, all that the better and conservative authors attempt to do in regard to the exact physiology of the kidney is to state the prevalent theories in regard to the production of urine. Every one knows that the kidney produces urine,—even the man on the street knows that—but how, which part of the kidney tubule produces which part of the complicated excretion known as urine? Concerning this—we have only theories, some of which are based on direct experiments, and some are merely the products of imagination and reasoning from the laws of physics and chemistry.

That such inaccuracy and haziness should exist with regard to the structure and function of the kidney is not because scientists have purposely perpetuated earlier misconceptions, nor because scientists have not studied the kidney. But it exists because, in the first place, the methods used have not been well chosen, and in the second place, because there are few organs in the body the study of which, at least the physiology of which, is so difficult to approach. The older histologists and anatomists described the structure of an organ from the study of individual slides; in other words, they attempted to describe a tree by the study of individual boards sawed from that tree; so no matter how many boards they studied, when they were through they knew a great deal about boards, but what could they know about the size of the tree, and the arrangement of its branches and leaves, and the kind and colors of the flowers and fruits of that

tree? And it was not until the organs were studied in serial sections that the extent and structure of the anatomical units of an organ could be accurately determined. With regard to the kidney, there is no published account of such studies of the adult organ. Further, the kidney seen after death is so rarely normal that the microscopical appearance of the kidney has been described from pathological specimens. As for the physiology of the kidney, no way has yet been devised of studying the exact physiology of the different parts of the functional unit. The studies so far made and the theories based on those studies, have in a large measure been performed on lower animals, and in some cases on animals so much lower than the human that the kidneys of those animals correspond to structures that existed so early in the embryonic life of the human that whatever has been found out from them has little or no bearing on the conditions in the adult. The difficulties which the student of the physiology of the functional unit of the kidneys faces may be stated in a few words as follows: Owing to the small size of these units and the complexity of the innervation and blood supply to these units, there is no way to separate them, to eliminate one link in the chain so as to find out what the others do. Therefore, all of our knowledge of the function of the kidney tubule must be gained by inference from whatever evidence can be found. And it is with the purpose of adding some points of evidence that this paper is presented.

The functional unit of the kidney, the uriniferous tubule, is structurally and functionally divided into four parts as follows:

(1) The glomerulus and capsule of Bowman.

(2) The proximal convoluted tubule and the descending portion of Henle's loop to the thin portion.

(3) The thin portion of the loop.

(4) The ascending arm of Henle's loop from the thin portion and the distal convoluted tubule.

The ordinary descriptions of the uriniferous tubule divide this structure somewhat differently, viz.: into the glomerules, the convoluted tubule, Henle's loop, and the distal convoluted tubule. But this division is purely arbitrary and is based neither upon histogenesis, nor upon structure, nor upon function. Further, you will notice that the junctional tubule and the collecting tubule have been omitted. These structures have a different histogenesis from the uriniferous tubule and serve merely as the ducts from the true functional unit.

Every student of the histology of the kidney has noticed that the descending arm of Henle's loop to the thin portion, has the same structure as the proximal convoluted tubule, that the cytoplasm is of the same character and that the nuclei are the same ring-like bodies irregularly placed. He will also have noticed that the character of the cells which compose the epithelium of the ascending arm of the loop are of the same character as those that form the epithelium of the distal convoluted tubule. The thin portion of the loop is lined with a rather deep simple squamous epithelium of the same general character, but thicker than the epithelium of the glomerular tuft and the lining of the capsule of Bowman. Thus we see that structurally the descending arm of the loop to the thin portion belongs to the proximal convoluted tubule, and that the ascending arm of the loop from the distal end of the thin portion belongs to the distal convoluted tubule. So we may speak of a glomerulus, a proximal system, composed of the proximal convoluted tubule and the descending arm of the loop, a distal system, including the ascending arm of the loop from the thin portion and the distal convoluted tubule, these two systems being separated by the thin portion of the loop. The fact that the arms of Henle's loop belong to the proximal and distal convoluted tubules and are auxilliaries to these tubules is based not only on the similarity of structure of these arms to the respective tubules, but also on the fact that whatever pathological process, such as cloudy swelling or atrophy, which affects the proximal convolut-

ed tubule also affects the descending arm to the thin portion, and likewise, whatever pathological process affects the distal convoluted tubule affects the ascending arm of the loop. This is proven more conclusively by the facts which will be brought out later. But before these facts are mentioned, and as a basis of comparison, the author will briefly describe the four parts of the uriniferous tubule as they were determined by the study of serial sections.

The glomerulus is a tuft or mass of anastamosing capillary arteries covered with a thin squamous epithelium which is continuous with the lining of Bowman's capsule. The tubule, from whatever angle it leaves the glomerulus, turns and bends on itself, going further from the glomerulus and back toward it. But in general it leads further and further away from the glomerulus toward the capsule. When it has progressed some distance from the glomerulus, it turns again more abruptly toward the glomerulus, and proceeds until it reaches the general level of that structure; then it makes a few spiral turns and plunges down the cortical ray as the descending arm of the loop, passing in as nearly a direct line as the presence of other structure will permit. After making the turn, which is abrupt, it ascends in a more direct line than on the descent until it reaches the glomerulus which it passes on the side on which the vessels enter and leave that structure; then it turns again and bends on itself getting further and further away from the glomerulus, until it comes to the junctional tubule. The average number of turns in the proximal tubule from the glomerulus to the last of the spiral turns above mentioned is forty. The average number of turns in the distal convoluted tubule is from ten to twelve.

The average diameter of the proximal tubule is 60 microns from basement membrane to basement membrane. The diameter of the descending arm of Henle's loop is about fifty microns. The diameter of the ascending arm is about 37 microns and the diameter of the distal convoluted tubule is about 50 microns.

The epithelium of the glomerular tuft and the lining of Bowman's capsule is a flat squamous type. As the tubule leaves the glomerulus the epithelium changes abruptly to a high glandular type, being about 17.5 microns thick. The epithelium of the descending arm is about 15 microns thick. The epithelium of the thin portion of the loop is a thick squamous type. The epithelium of the ascending arm and the distal convoluted tubule is about 12 microns thick. With this description of the normal uriniferous tubule in mind, let us turn to the points of the pathology of this tubule which indicated the function of the various divisions given above.

Attention has already been called to the fact that whatever pathological process affects the convoluted tubules affects also the arm of the loop belonging to the respective convoluted tubule. Studies carried on by the author to ascertain, if possible, by what means a kidney weighing 100 grams (3.5 ounces) or less (and most of that being connective tissue and degenerated and atrophied tubules) could carry on its function until that reduced state had been reached, brought out the following facts regarding those tubules which were functioning at the time of death:

(1) The glomerulus had increased in size until it was twice or more the diameter of the normal structure.

(2) The epithelium of the first few turns —ten to twelve—of the proximal convoluted tubule had changed from the high glandular to the same flat squamous epithelium as that covering the glomerular tuft and lining the capsule of Bowman.

(3) The remainder of the proximal convoluted tubule had increased in diameter from an average of 60 microns to an average diameter of 115 microns and the tubule had lengthened from forty turns to from 95 to 106 turns.

(4) The descending arm of Henle's loop had increased in diameter from 50 microns to the approximate diameter of the hyperplastic convoluted tubule and from a nearly straight tube it was twisted and bent on it-

self making about eighty turns. The epithelium of this proximal system was in all respects the same throughout and of the same general character as that found in the normal convoluted tubule. The thin portion of the loop was only a little enlarged and lengthened. The ascending arm showed little change except some increase in diameter and the distal convoluted tubule had but few more turns and was little enlarged over the normal.

These facts lead us to conclude:

(1) Because of the enormous hyperplasia of the proximal system and the comparatively slight changes in the distal system of compensating tubules, the proximal system plays a much larger part than does the distal system in the formation of urine.

(2) The epithelium of the capsule of Bowman shares with the epithelium of the glomerular tuft the beginning of urine formation, because when a few tubules were called upon to perform the function of many which had ceased to function, there was an enlargement of the glomerular tuft, which greatly increased the amount of the epithelium of that structure; in addition the epithelium of the capsule of Bowman was also increased not only by the enlargement of the capsule but also by the changing of the epithelium of part of the proximal tubule from the high glandular to the flat squamous type like that of the capsule. This was a uniform process in all of the compensating tubules and it was not an atrophy but a change to a different type of epithelium.

(3) What may be inferred from the histology, that the descending arm of the loop belongs functionally to the proximal tubule, is supported by the changes which took place in these compensating tubules.

To sum up, from the pathology of the kidney tubule, it may be divided functionally into four divisions; (1) the glomerulus and the capsules of Bowman; (2) the proximal system including the proximal convoluted tubule and the descending arm of Henle's loop to the thin portion; (3) the thin portion of the loop; and (4) the distal system composed of the ascending arm from the thin portion and the distal convoluted tubule. Furthermore, it may be concluded that the proximal system performs the greater part of the formation of urine.

Now, if the author may be so bold as to suggest the probable steps in the formation of urine, he would say that they are as follows: The water and the probably simpler inorganic constituents pass through the epithelium of the glomerulus and the capsule. The more complex inorganic and the organic elements with the exception of sugar are added by the proximal system. In the thin portion of the loop some of the water is reabsorbed into the blood. The distal system adds the sugar. The evidences for these latter two processes have not been given previous to this time, but they will be now. The sugar is added by the distal system; this is shown by the fact that an examination of the kidney tubules in cases of glycosuria reveals the fact that the epithelium of the distal system shows an infiltration of glycogen which is found in no other part of the tubule and which indicates that the sugar is passing through this epithelium. That some of the water of the urine, as it is found in the proximal system, is reabsorbed in the thin portion of Henle's loop is shown by the fact that certain precipitates, such as casts, are first found in the distal system, a fact that can be interpreted as indicating that the urine found in this part of the tubule is more concentrated than that found before the urine has passed the thin portion of the loop. The evidence here presented agrees with and corroborates the inferences which can be drawn from a study of the histology of the kidney tubule, and it is generally known that that function depends upon structure, or that the function to be performed determines the character of the structure.

REACTIONS TO RADIUM AND THE ROENTGEN RAY

BY ALBERT SOILAND, M.D., F.A.C.P.,

Professor of Radiology, College of Physicians and Surgeons, University of Southern California, Los Angeles, California

THE subject of ray reactions is one of extreme interest to radiologists, as upon a thorough knowledge of the different steps of physiological action and reaction will depend one's ability to successfully combat pathological tissue changes. Time and again have we been stimulated to a degree of enthusiasm by observing unsightly neoplasms disappear as if by magic under a few well-directed applications of radiant energy. First it was the *x*-ray, and now it is radium. It must be truthfully stated, however, that many times our ardor has been dampened when we have failed to get the expected results in a number of cases in which no visible reason appeared to account for such failures. Whether these negative results are due to differences in the cellular construction of the lesion or to faults in our technic of treatment, is not yet clear, although both may have a distinct bearing on the situation.

The whole complicated matter of ray intensities, adjustment of apparatus, filters and distance, and general technic of application has been so well worked out and so clearly presented in recent publications that we may well omit any discussion of these questions here. A few general remarks, however, bearing upon varying phases of reactions, both physiological and pathological, may be of sufficient interest to warrant consideration and discussion.

It is assumed that we are all familiar with the ordinary responses to ray exposures of so-called therapeutic dosage, but when we are suddenly confronted by a ray response from one to six years after a supposedly safe application, which response takes on the characteristic of a malignant disease, it gives us reason for serious thought. Did we err in our technic, or was the patient subject to ray idiosyncrasy? Despite a general belief among radiologists to the contrary, the writer believes that patients exhibit a greater idiosyncrasy in regard to *x*-ray and radium than to any other agent which gives rise to similar phenomena.

In the light of our present day knowledge of ray reactions can we formulate a hard and fast rule for intensities, length and repetition of treatment? What is a safe time limit for repeating an *x*-ray series in, for example, a postoperative breast case? The usual time recommended is three weeks between exposures to the same region. In the writer's opinion, there should be allowed only one repetition after the interval mentioned, with a lapse of three months before further work is permitted. A patient often comes from the surgeon with instruction to have an *x*-ray series applied once a month for a year. If this means that the patient is ordered to have a so-called massive dose over the same skin area, twelve consecutive times within a year, particularly if this area happens to be tightly drawn skin over a bony chest wall, the result will probably be extremely disastrous. Much, of course, depends upon what is considered a massive dose and the quality of rays used. These remarks are intended to apply to the dose standard which is generally accepted as a massive or filtered erythema dose by America's leading roentgenologists. The writer would welcome an expression of opinion from members

of the Radiological Society of North America, as to what constitutes a proper time interval for repeating such series. As far as the writer's own practice is concerned, he is in the habit, in postoperative cases, with no evidence of recurrence, of giving two series in one month, one more in three months, one in six months, then one at the end of two years. If a recurrence appears, then his practice is to push treatment to the limit of tissue tolerance.

A word of caution is perhaps not out of place in regard to the generally accepted belief that a severe reaction to radium may be disregarded. It must be borne in mind that the application of radium to human tissues in large quantities is of such recent undertaking that a sufficient time has not yet elasped for us to observe remote effects. Attention is further drawn to the similarity of reaction between hard beta and soft gamma rays of radium with a stream of *x*-rays from a hard functionating Coolidge tube. We already know that repeated overaction of the latter may in certain cases bring on, a long time after such reaction, an irreparable lesion. The writer has met with several instances when such delayed reactions appeared several years after massive radium treatment.

While the same precautions that apply to roentgen ray therapy may be observed in radium work, there are certain individual distinctions to bear in mind in connection with the latter. The small bulk of the radium applicator, its position directly in contact with the tissues, its restricted zone of intensified radioactivity, all serve to greatly influence cellular action at the point of contact. In prolonged application this can easily be carried to a point of cell destruction and death of the parts within the sphere of influence. Such an overt reaction, when it involves large fleshly parts, is not so serious, but when it appears on the skin over a cartilaginous or bony prominence, permanent damage results. On mucus membranes, and particularly in tubular canals, when the lumen is of small diameter, any radium overaction frequently results in disaster. Thus in the urethra, rectum, or vagina, radium perforations are not uncommon. These, it is true, often heal, but in the process of repair the mucous membrane and the elastic musculature disappear and in their place a contracted ring of fibrous scar tissue forms, which is often so severe a sequela as to abolish function of the organ involved. In the bladder, radium burns are of relative frequency, and with a concomitant perforation, spell disaster. The fact that radium needles are ordinarily used unscreened in this field, naturally accounts for the trouble. Another source of annoying overaction is insufficiently protected lead screens. Lead, more than any other metal, seems to give off soft secondary beta rays, thus causing intense local reactions when we aim at more distant regions. This can, of course, be obviated by proper additional insulation.

In regard to the treatment of these untoward reactions, we have as yet secured no great encouragement. The erythematous and vesicular reactions are of no great consequence, being evanescent in character. They rarely produce more than a temporary itching and burning sensation, easily controlled by a detergent lotion or a protective dry dressing. The third degree, or ulcerative ray reactions, are of grave concern and demand the utmost care and judgment in treatment. If we recall that the extreme sequelæ of these untoward reactions vary in intensity from a necrotic ulcer to a condition resembling dry rot, and that each case will require treatment to fit its particular needs, and then remember that we have no specific remedial agent, we realize at once the futility of hope for a rapid cure. Furthermore, the fact that we are dealing, not with an acute lesion, as from an injury, or a situation resulting from any other extraneous physical force, but with a condition due to a physiological death of cellular bodies that are necessary adjuncts in the repair of protoplasm, makes any attempted treatment except radical surgery of questionable value. In our dealings with a number of the unfortunate conditions enumerated, a few salient features are apparent, the most

prominent of these being pain. Every *x*-ray or radium burn in their class, gives rise to constant pain, and this is not relieved by any sedative, protective or stimulating combination of drugs known, except opiates or anesthetics. As the latter interfere materially with the healing process, they are employed only long enough to allay the acute pain, or until the patient has become sufficiently used to the pain to permit more reconstructive treatment. In the cases in which the lesion is so situated that its surgical removal is a possibility, this is the proper method to pursue. The whole area involved should be dissected out freely and skin grafting or a plastic operation performed, if such procedure seems feasible. In lesions not so located or in those so extensive as to render surgery impossible, certain procedures are suggested which may be more or less successful. As a general rule ointments are contraïndicated. The best general application for extensive surface involvement is the well-known Dodd's solution, a white wash after the formula of Walter J. Dodd, one of America's pioneer roentgenologists and a true martyr to our science. After this, any wet dressing of a mild alkaline nature may be used, such as boral solution, diluted for continual application. Where the ulcer is deep, the writer has had some success with a solution of pyoktanin blue, 10 grains (.650 gram) to the pint, as a continuous wet dressing. The paraffin dressings have not been so successful in the writer's hands, nor has the Carrol-Dakin method, which gives such good results in large infections of traumatic nature. Later in the case, after perhaps months of careful and painstaking dressings, there comes a time when stimulating ointments may be used for their epithelizing effects. Finally the patients recover, at least, the majority of them.

A final word about the assertion that radium may be used to cure *x*-ray burns. This is preposterous and not worthy of discussion. Precancerous keratosis, whether produced by sunburn, old age, or an ancient *x*-ray sequela, can, of course, be successfully removed with radium, but an *x*-ray burn, as we understand the term, never.

The following comparative study will suffice to show the comparative reactions to radium and the roentgen ray:

COMARATIVE STUDY

Radium

Physiological Reaction

Appears usually within twenty-four hours. First pink, then scarlet and later tan, with or without desquamation, according to period of intensity.

Pathological Reaction

Appears within a few hours. Bright redness. Limited to a few millimeters beyond margin of application. In a few days vesiculation, multiple small blebs, and numerous bleeding points, usually not painful. Area soon covered by yellowish white crust, which becomes dry and hard, peels off usually within two weeks, leaving depressed, smooth pink scar.

Delayed Reaction

Very rare. No reliable data as to nature and extent of such reaction. Will necessarily appear after prolonged gamma ray irritations.

Roentgen Ray

Physiological Reaction

Appears from fifth to fifteenth day. Reddish brown, more pigmented in appearance, has a deeper set, maintains its inflammatory nature longer, tans more slowly, no desquamation.

Pathological Reaction

Appears in from three to ten days. Dark purple red, well beyond margin of exposed area. In from two to three weeks large confluent blebs giving way to ulcers. Rarely bleeding. Irregular ragged edges, very painful, no tendency to crust formation. Very slow to heal. Finally covered by inelastic epithelium with telangiectasis.

Delayed Reactions

Have been known to appear in the writer's experience as late as six years after roentgen treatment. Often occurs from one to two years after an apparently normal series of exposures. While usually occurring over area of telangiectasis, have been noted where no former visible reaction appears. Are distinctly trophic in character, are occasionally gangrenous. Frightfullly reluctant to heal, usually requiring surgery.

APLASTIC PERNICIOUS ANEMIA*

BY EM. P. BENOIT, M. D.

Professor of Clinical Medicine, University of Montreal, Montreal, Province of Quebec, Canada.
Physician to the Notre Dame Hospital.

MONTREAL, CANADA.

WITH Dominici we can define anemia as "a state characterized by the diminution of the red blood-corpuscle and hemoglobin contents." And this explains the French classification of the anemias, viz. globular or hypoglobular, or simple anemia and hemoglobin anemia or chloroanemia, or chlorosis.

This classification is no less artificial than all those previously proposed. For simple anemia may be pernicious, that is, it may be accompanied by extreme blood insufficiency, and chlorosis almost always presents a greater or lesser degree of hypoglobulia.

The anemias have been divided by others into the primary or essential and the secondary or symptomatic. Secondary anemia arises from a distinct cause: chronic alteration of the digestive tract; chronic infection (tuberculosis, syphilis); acute infection (typhoid fever, puerperal septicemia); poisoning (lead, carbon, dioxid); helminthiasis (Bothriocephalic, Ankylostomic); cancers (especially gastric); repeated hemorrhage (ulcers, hemorrhoids, metorrhagias); nephritis; chronic albuminuria; and hemolytic icterus. Primary or essential is deemed cryptogenetic, as its cause remains unknown. It however exists even though unknown to us. For in medicine there is no result without a cause. And the effect of this unknown cause is clearly evident on the blood-forming organs, that is the bone-marrow, lymphatic ganglions and the spleen. This is true, at least in the plastic forms.

Barker's classification (*Monographic Medicine,* iii) is the most rational. He divides anemia into the following: anemias by blood spoliation or by globular destruction, and anemias from disturbances in the blood-formation or alteration in hemoptiasis. The first comprise posthemorrhagic anemias, secondary anemia, and plastic pernicious anemia. In the second group one finds chlorosis and anemia from insufficiency of bone-marrow action (comprising aplastic pernicious anemia). The word primary, essential or protopathic disappeared, and anemia in all its forms became to be a definite syndrome from known or unknown cause.

One may be surprised to find pernicous anemia put under these two groups. However, Barker's opinion, based, by the way, on Moravitz's, is that plastic pernicious anemia of the Addison-Biermer type is due to persistent globular destruction in spite of active reactions on the bone-marrow. The aplastic type is due to the incapacity of the marrow to produce red corpuscles.

*This paper was read at the Societe of Medicale des Hopitaux de Paris, on May 13th, 1921.

This view is in accordance with the French view point. A. Clerc (*Pratique Medico-Chirurgicale,* 1911) clearly states that it is no longer justifiable to clinically isolate progressive pernicious anemia (Biermer's disease). Paul Ribierre (*Precis de Pathologie Interne,* 1912) states the reasons; viz, blood changes do not solely occur in essential anemia; cytological characteristics cannot give enlightenment on the nature of the anemia. They simply give information on the intensity and mode of reaction of the hematopoetic apparatus. Diagnostically they are of no importance, but physicologically, pathologically and prognostically these hematopoetic reactions are of use.

It seems that, according to the present state of knowledge, blood characteristics in pernicious anemia, at least in its common form, only indicate the effort of the bone-marrow to establish the globular equilibrium, which is menaced by the disease. There is a rapid formation of nucleated red corpuscles which are increased in volume. The bone-marrow hastily produces these young embryonic blood-forms in order to counterbalance deglobulization which is endangering general nutrition. The hematopoetic reaction is intense and can be seen even in the bone-marrow of the diaphysis of the long bones. The reaction is greatest in the bone-marrow, where the erythroblasts are formed, and whence alone the healing erythrocytes can be derived. The intense reaction gives a remission only, as the hemolytic cause whatever it may be continues to act on the blood constitutents. The disease is more powerful than the defensive powers of the system. This, in brief, is the pathologic physiology of the common form of plastic pernicious anemia. In some rare cases the organism will be incapable of defense. The blood will rapidly become deteriorated, without medullary reaction occurring. The disease will develop rapidly without remission. No erythropoiasis will set in. This is the aplastic type of pernicious anemia. There is a double pathological action; viz, on the blood and on the bone-marrow. It is impossible to determine where the process starts.

These facts are important for the diagnosis and prognosis. It is evident that blood tests do not suffice to diagnose pernicious anemia. If young elements are present: large red blood-corpuscles (8.10 microns), nucleated hematids, polychromatophyl hematids, deformed hematids, they show lively medullary reactions, and a profound irritation of hematopoiesis. But all these signs may be lacking, the blood may even lose its high globular value. It may simply cytologically indicate intense hypoglobulia, and then the case is especially grave. Pernicious anemia has been said to be progressive and always fatal. So it is; but severe anemia also may ultimately prove fatal. The only difference is that severe anemia may be cured, if the cause is known, and combatted, whereas the cause of pernicious anemia is unknown, and therefore we do not know how to treat it. There lies the fundamental difference.

An observation which was made at the Notre-Dame Hospital seems most demonstrative.

OBSERVATION

Ph. Er., forty-four years old, laborer, enters the surgical service at the Notre-Dame Hospital, Nov. 22, 1920, on account of lumbar pain and hematuria.

Family History.—The patient was a member of a tuberculous family. His mother died young during a confinement. One brother died of tuberculosis of the larynx at the age of 38 years, and some uncles and aunts have died of tuberculosis. The patient himself, three or four years ago, had some lung trouble which was treated as tuberculosis by the attending physician. He reported that he had rales and crepitation, which lasted but a short time, as the patient had passed "into the chronic stage." Before that there had been no illness.

Clinical History.—The disease had lasted one year. In the autumn of 1919, the patient felt a pain in the left side, resembling lumbago, which lasted three weeks and ended in hematuria. It recurred from time to time, rather frequently. At last, hematuria set in and did not stop. The patient lost strength and became anemic. The color of the skin was yellow and wax-like.

Present State.—The urine was of a uniform red color. It formed a deposit but did not lose its color. Examination showed the presence of numerous red blood-corpuscles and some albumin. Density was 1028. There were 13.50 grams (208.336 grains) of urea to the liter, and 0.41 gram (6.3273 grains) in a liter of blood. The constant ureic contents were 0.12 gram (1.852 grains). The urine did not contain urobilin. The patient was put under narcosis on November 27. Cystoscopy had a negative result. He was brought back to his bed. The patient had a chill. The next day excessive epistaxis made tampons of the nasal fossæ neces-

sary. Hemorrhage from the nose recurred on December 2 and 3, and just as violently. The patient grew visibly weaker. No tumor was discernible in the abdomen. On the first of December the temperature rose to 102.2° F. (39° C.) Arterial pressure was 110 maximum, and 55 minimum (Tycos).

The author was called into consultation on December 1. He found an excessively pale man, thin, and cachectic. The mucous membranes were bloodless. The skin was yellow, waxy. The pulse-beat was 100, small and very much depressed. The patient was very weak, very exhausted. The examination of the organs was practically negative. The heart sounds were very weak, anemic souffle, dulness at the apex of the left lung, without positive signs of tuberculosis, pain in the splenic region without hypertrophy of the spleen, or the ganglions, dulness of the liver, which was slightly diminished (8 cm.), and fever without abdominal symptoms. Blood examination showed: hemoglobin 30 per cent; red corpuscles 1,325,000; globular value 0.90; white globules 4,700. The leukocyte formulae were: mononuclear 39 per cent; polynuclear 60 per cent; eosinophils 1 per cent. No deformed red blood-corpuscles were present.

The case caused some worry. The hematuria suggested tuberculosis or cancer of the kidney with consequent anemia. Epistaxis gave warning of a general blood hemolysis. Blood examination showed simple hypoglobulia, but accompanied by leukopenia and a relatively high globular value. These signs, with the fever and absence of noticeable organic lesions led to the diagnosis of pernicious anemia. The patient was transferred to the internal department.

For two weeks the author watched the patient's decline, which in many respects was precipitious, although hematuria had ceased. The muscles waned under his eyes; the pulse was miserably bad; the patient became more and more emaciated, and grew somnolent and delirious. At last muscular tremor set in and the temperature dropped below normal. Fedeing the patient was difficult. Fowler's solution in large doses, citrate of iron, quinin and strychnin, quinquina wine was given, but could not stay the rapid course of anemia, which had, by the way, started before the patient came to the hospital. The patient died December 18.

Autopsy.—The body was very much emaciated, of a waxy yellow shade, and perfectly drained of blood. Incisions caused hardly any bleeding. The heart contained neither clot nor fibrin. Slight blood was found only in the large deep-seated vessles. The heart and lungs were healthy, except a pleural adhesion at the apex of the left side. The digestive tract and liver were normal. The spleen contained in its median part a large infarct. The kidneys were normal, except a blood clot in the pelvis of the right. The bladder and prostate were normal. Permission to examine the nervous system and the bone-marrow was not given. Iron pigment were not looked for.

The author regrets that the autopsy is not more complete. Such as it is, however, it proves that the patient succumbed to a rapidly progressing pernicious anemia, and that the lumbar pain was evidently caused by the splenic infarct. No organic lesion, except general denutriton, can be considered to have caused death. The blood examination showed that the bone-marrow had not reacted. The case is evidently one of pernicious anemia of the aplastic type.

All authors agree that aplastic pernicious anemia is rare, and that it causes more abundant and severe hemorrhages than the plastic type. R. C. Cabot (Osler's *Modern Medicine,* 1908),in the picture which he gives on page 638 of 24 cases of aplastic pernicious anemia, cites only one which had determined by hematuria. He mentions, on the other hand, 182 cases of plastic pernicious anemia, 2 of which only were accompanied by hemorrhage from the urinary tract. Epistaxis occurred in 53. The author's case, therefore, is the more interesting.

The following conclusions may be made:

(1) Autopsy has revealed excessive anemia without evident lesion.

(2) The blood examination showed the intensity of the anemia, and complete absence of defensive reaction.

(3) The case is one of aplastic pernicious anemia.

(4) Perhaps this rare form in this patient was favored by a constitutional predisposition (familial tuberculous), or an hematopoietic weakness (miopragia).

(5) The intensity of the hematuria, without renal lesion, is remarkable and must be considered cryptogenetic. Extreme changes in the blood are evidently the cause.

(6) The medical profession is left resourceless to combat a condition of such intensity, and such indeterminate cause.

POLYCYTHEMIA, WITH REPORT OF TWO CASES

BY TOM BENTLEY THROCKMORTON, B.Sc., M.D., F.A.C.P.,

DES MOINES, IOWA.

DURING the summer of 1908, while studying in the office of my preceptor Dr. Frank P. Norbury, then of Jacksonville, Ill., it was my opportunity to see, for the first time, a case of polycythemia megalosplenica. A woman of perhaps thirty-five or forty years of age, with marked cyanosis and a splenic tumor which filled the major portion of the left abdomen, was admitted to the Maplewood Sanatorium for observation. Some mental disturbance was present, more of the confused state, but the clinical features most prominent were the high hemoglobin percentage, the erythrocytosis, the marked cyanosis and the splenic enlargement. At that time something over 20 cases of chronic polycythemia with cyanosis and enlarged spleen were on record, but the etiology and pathogenesis of the condition was practically unknown.

Pathologic increase in the erythrocytes, associated with chronic cyanosis and splenic enlargement, was a new symptom-complex to which Rendu and Widal called the attention of the medical profession in 1892. Seven years later, Vaquez brought the syndrome into more general notice, followed by Tück in 1902, and Osler in 1903, all of whom believed that the disease was due to a primary hyperplasia of the erythroblast bone-marrow rather than to a primary splenic tuberculosis, as was formerly believed. There can be no question but that Osler's work greatly stimulated research workers and, particularly on the American continent, the disease, now under consideration, was often alluded to as Osler's disease. While case reports have not been numerous, still it may be safely stated that something over 30 additional cases have been placed on record during the past ten years, although the number of autopsies still remains small. With these further studies it was ascertained that a pathologic increase in the red blood-cells was not always associated with splenic enlargement and Geisböck described a second form, or polycythemia hypertonica, in which the blood-pressure was, as a rule, quite high and was associated, in the majority of cases, with nephritis without splenic enlargement. In other words, this condition consisted of the peculiar symptom-complex of a persistent absolute polycythemia nonmegalosplenica, associated with hypertension and renal changes.

With these brief remarks concerning this disease entity, the author invites attention to a consideration of 2 case reports, in each of which polycythemia played the leading rôle, but in one instance the blood changes were overshadowed by a train of nervous symptoms probably due to cerebral thrombosis and, in the other instance, hypertension, nephritis, hemorrhagic oozing from mucous membranes and uremic symptoms tended to blurr the true clinical picture.

CASE 1.—POLYCYTHEMIA. WITHOUT MARKED SPLENIC ENLARGEMENT — THROMBOSIS — DEATH.— Mrs. W., age sixty years, white, was seen in consultation with Dr. Daniel Crowley, March 16th, 1918; she was suffering from weakness of the low-

er extremities, a condition first noticed about a month previously and which was said to have grown worse during the past fortnight. The family history was negative, save the death of her father at seventy-seven years of age and her mother at seventy years of age, due to "strokes" of paralysis. Two brothers and two sisters were said to be well and enjoying good health. The patient was well and strong as a girl. She had never had a serious illness, operation or traumatism. Her menstrual epoch was established at seventeen years; she was married when twenty-three years old; she was the mother of one son, who died as a result of an injury at thirty-four years of age; and she successfully terminated a normal climacteric at forty-three years of age. The appetite was said to be good, bowels fairly regular, urine rather scant and sleep variable. No noticeable change was observed in the body weight which remained in the neighborhood of one hundred pounds.

The onset of her trouble was ushered in with weakness of the lower extremities. About a month previously, the patient had noticed that she did not feel well and that the toes tended to drag, making it rather difficult for her to step over slight obstructions or to climb stairs. Some numbness was also noticed in the legs and feet and at times paresthesiæ were present in the hands. There was no dizziness, diplopia or vomiting, but occasionally headache was present. The weakness of the lower extremities gradually increased until the left leg suddenly gave way and the patient had a hard fall two days prior to the time the author first saw her.

An examination revealed some rather interesting clinical findings. The pupils were equal and reacted to light and in accommodation and convergence. The ocular movements were free and equal in all directions and there was an absence of nystagmus, diplopia or hemianopia. The eye grounds examined under a mydriatic showed the optic disks to be rather pale and the veins large, tortuous and extremely dark in color. Aside from some slight diminution in hearing on the left side there was no evidence of cranial nerve involvement. The cardiac dulness extended slightly to the left of the nipple line, and a soft systolic murmur was heard over the mitral area. The pulse was 80, oral temperautre 98 3-5° F. (37° C.), systolic blood-pressure 165 mm., diastolic 110 mm. The knee and ankle jerks were very active, but the weakness and incoordination, which were present, were more noticeable on the left side. The gait was slow, hesitating, of the spastic type, and there was a tendency to drag or scrape the toes of the left foot. While the toe movements on the left side were of an undeterminate character, extension of the toes by the Gordon and Chaddock methods could be obtained on the right side. The deep jerks of the arms were readily obtained and equal; the grip was fair. Sensation was preserved and localization accurate. The abdomen was negative except for a slight enlargement of the spleen.

Perhaps the most striking clinical feature observed was the appearance of the skin, which was of a peculiar, mottled, reddish color, with marked cyanosis of the lips and finger-nails and an extremely florid complexion. The author's attention was called particularly to the dermic phenomenon by the high degree of cyanosis which occurred when the arm was compressed by the sphygmomanometer band. The application of moderate contriction caused the mottling of the skin to become more prominent and as the pressure was increased, the color became intensely redder and darker and the finger nails of an extremely cyanotic hue.

Hemanalysis showed the hemoglobin to be 140 per cent (Sahli), erythrocytes 7,500,000, leukocytes 28,000, with a differential count as follows: polymorphonuclears 84 per cent, lymphocytes 6 per cent, mononuclears 6 per cent, cosinophils 2 per cent, basophils 2 per cent. The blood smear was negative for pathologic types of erythrocytes or leukocytes. Urinalysis was negative except blood was present by the Weber test. The blood Wassermann test was negative.

Three days later during the early morning hours, the patient became restless, was nauseated, had involuntary evacuations from kidneys and bowels and for several hours remained in a stuporous condition. When the author saw her several hours later, complete motor aphasia, associated with marked spasticity of the right arm and leg, pronounced right-sided clonus, and loss of the extensor toe reflex by all methods was present, but later the Babinski sign became manifest. The axillary temperature registered 97 1-5° F. (36.22° C.) on the right side, and 96° F. (35.56° C.) on the left side. The patient could be aroused and obeyed simple commands, but upon the whole the mental processes were greatly in abeyance. Spinal puncture was later done and about 20 c. c. of clear fluid, which was under moderate pressure, were removed. Subsequent examination of the same showed ten cells to the c. mm., and the Wassermann test positive. The hemoglobin still remained about the same, with the erythrocytes at 7,800,000 per c. mm. Following the spinal tap free bleeding was resorted too, after which the patient aroused and spoke a few words and later read a newspaper with apparent satisfaction. In spite of antiuetic treatment, the patient pursued a downhill course and died in a comatose state on the thirty-first of March, fifteen days after the author first saw her and twelve days after her thrombotic stroke. A week prior to death the red cells increased to 9,000,000 and the leukocytes to 33,000 per c. mm. No autopsy was obtained.

Case II.—Polycythiemia, Without Splenic Enlargement, Associated With Hypertension, Nephritis and Uremia; Death, Autopsy; (Polycythiemia Hypertonia).—Miss C., thirty-two years of age, stenographer, was seen May 11, 1919; she was complaining of precordial distress with pain in the left arm, palpitation, headache, photophobia and transcient amaurosis. The more acute symptoms had occurred within the two or three weeks preceeding the author's visit, but the patient stated that she had not been at all well during the past eight months. The family history was negative. Her father met an accidental death at sixty-two years of age; the mother was living and well. She had one brother, aged forty, who was well, with the exception of some cardiac trouble; an only sister, aged thirty-five, enjoyed fair health, but had had some circulatory trouble following an influenza infection during the epidemic. The personal history was also largely negative. The patient had enteritis at nine and diphtheria at twelve years of age, with good recoveries. She was supposed to have had an attack of appendicitis at twenty and an abscess of the left kidney at twenty-seven years of age: apparently good recoveries ensued. She began to menstruate at thirteen years of age; her periods were regular, the flow lasting about six days. During the past four or five months, however, the flow

had been quite profuse and continued fully two weeks at a time.

The onset of the present trouble was insidious and in reality extended over a period of two years or more, although the general health was not appreciably impaired until of more recent time. While following her duties as a stenographer, her associates and friends not infrequently chided her about her florid complexion and "tipplers" nose and, during the coldest weather, she went about in perfect comfort though but scantily dressed for one during the winter months. Her work was rather strenuous and confining and in spite of feeling bad for several months she continued at her duties until obliged to desist on account of headaches and temporary periods of blindness. For a number of months she noticed that blood oozed rather freely from the gums and not infrequently in the morning on awakening she would clear the mouth of a considerable amount of blood.

Questioning concerning her personal habits brought out the interesting fact that for over two years, owing to a religious belief, she had subsisted almost entirely on a vegetable diet and, although picayunish in her eating, her bodily weight apparently had suffered but little. The emunctory functions of the body were properly performed, although the urinary output never was profuse. Two weeks prior to coming under the author's observation she was taken one evening, while preparing for bed, with an epileptiform attack in which loss of consciousness supervened for a short time, associated with stertorous breathing and a tonic convulsive seizure.

Examination revealed some rather striking clinical phenomena. There was no disturbance of station or gait. The pupils though dilated, were equal, regular in outline, and reacted promptly to light and in accommodation and convergence. The extrinsic ocular muscles acted normally and there was an absence of nystagmus, diplopia or hemianopia. The optic disks were highly edematous, the retinæ blurred, and the veins enlarged, dark in color and tortuous. Photophobia existed to a high degree and slight pressure on the eyeballs caused much pain. There was no other cranial nerve disturbance. A previous assertion made by a "heart specialist" that the patient was ill as a result of a severe cardiac lesion, could not at this time, nor at any subsequent examination, be borne out by clinical evidence. The cardiac area extended three and half inches to the left of the midsternal line; the apex beat was in the fifth interspace; there was a soft presystolic murmur over the mitral area, and the second aortic sound was somewhat accentuated. The soft, short presystolic murmur, however, was later replaced by one systolic in character, which, as time intervened, was found to be of a variable or evanescent nature, so often characteristic of a functional type of cardiac murmur. The pulse-rate was 110 per minute, systolic blood-pressure 195 mm., diastolic 120 mm. The lungs, abdominal and pelvic organs appeared normal. No enlargement of the splenic dulness could be detected. The tendon jerks were all active but no clonus could be elicited. On the left side, there was a suggestive extensor movement of the great toe by the Oppenheim and Gordon methods. The abdominal reflex was absent but sensation and localization were preserved and accurate.

The color of the skin and mucus membranes, as in the previous case, presented a very striking appearance. The face was florid, the conjunctivæ engorged, and the mucus membrane of the lips cyanotic to an extreme degree. The palms of the hands were crimson and the finger nails blue. Application of pressure about the arm by means of the sphygmomanometer apparatus brought out the changes in the skin below the constriction to a marked degree. The superficial capillaries became so swollen and engorged that, following the release of pressure, the entire extremity below the arm band was covered with petechial spots varying in size from a pin point to several millimeters in diameter. Much discomfort was complained of while the constriction was made, and the parasthesia resulting from the pressure and venous stasis lasted much longer than one ordinarily observes in the taking of blood-pressure readings.

The laboratory findings were positive as regards involvement of the circulatory and renal apparatus. The blood flowed very slowly from the puncture opening, was extremely dark in color and coagulated very quickly. The hemoglobin per cent was 120 (Dare), erythrocytes 8,800,000, leukocytes 10,500, differential count as follows: polymorphonuclears 86 per cent, large lymphocytes 3 per cent, small lymphocytes 9 per cent, mononuclears 1 per cent, transitionals 1 per cent. The morphology of the red cells appeared normal. The urinary output for twenty-four hours was 1200 c. c., the specimen was clear, amber, acid in reaction, specific gravity 1011, albumen XXX, glucose negative; centrifuged specimen showed an occasional hyalin and hyalogranular cast. The blood Wassermann was negative.

The treatment employed consisted principally in stimulating the emunctory agents of the body. Venesection aided materially in lowering the blood-pressure and relieving the headache. The bleeding from the uterine and gingival mucus membranes ceased and the high colored and cyanotic hue of the skin largely, if not entirely, disappeared. The blood-pressure varied from a maximum of 220 mm. systolic and 140 mm. diastolic, to a minimum of 130 mm. systolic and 85 mm. diastolic; the average pressure usually ranged between 170 -180 mm. systolic, and 120-140 mm. diastolic. Potassium iodid was given in the hope that it might decrease the viscosity of the blood. Suffice it to say that the improvement, while gradual, was marked. The albumin content of the urine varied from zero to a 3 mm. ring with the nitric acid contact test, while casts were never found in large quantites, there usually being a few hyalogranular or finely granular casts observed in a centrifuged specimen. The hemoglobin gradually fell until it reached 92 per cent (Dare), and the erythrocyte count varied from 7,000,000 to 9,000,000. The edema of the optic disks decidedly improved while the photophobia and tenderness of the eye balls entirely disappeared. During September the patient made a visit to Lincoln, Nebr., and she was under the careful attention of Dr. John Mills Mayhew during her stay in that city. Following her return home a month later, a letter from Dr. Mayhew stated that he could but confirm the diagnosis, and that neither the blood chemistry nor the Mosenthal test, which he made, apparently shed any furthur light on the subject.

During the next two months no particular change was noticed in the patient's condition, save the nephritic symptoms tended to predominate the clinical picture. At times, headache, undoubtedly of uremic origin, would manifest itself for a time,

always accompanied by a low urinary output and an increase in the albumin content.

Early in January, 1920, she was taken ill with an attack of acute tonsillitis; the toxemia of this condition was marked and aggravated greatly the already over-taxed kidneys. As a sequel of the infection, painful erythematous nodules appeared along the anterior tibial regions of both legs. The recovery from the tonsillar infection was imperfect and undoubtedly the strain, thrown upon the system at that time, in attempting to eliminate the poisons, was the factor which brought on, without warning on January 21, a series of uremic convulsions in one of which death intervened. On the day previous to her demise, she appeared in good spirits with the exception of the one complaint, headache. At that time the systolic pressure registered 175 mm., and the diastolic 140 mm. The hemoglobin was 85 per cent (Dare), leukocytes 13,000 c. mm.; erythrocytes 9,600,000 per c. mm., with a differential count as follows: polymorphonuclears 83 per cent, large lymphocytes 2 per cent, small lymphocytes 14 per cent, mononuclears 1 per cent.

Twelve hours after death an autopsy was preformed by Dr. Julius Weingart, which proved, as far as macroscopic evidence was concerned, that the symptom-complex of Geisbock has apparently but little anatomic foundation. The heart was without pathologic change save the presence of a few nodules along the insertion of the mitral and tricuspid valves. The spleen was but little enlarged and showed no perceptible changes indicative of primary tuberculosis, a finding formerly held by the French to be of great etiologic significance in cases of polycythemia. It is needless to state, however, that this theory has long since been laid aside for lack of substantiation on proper anatomic investigation. The kidneys showed the most marked change of any of the organs; both were much smaller than the average, and the changes seemed to be of an interstitial, rather than of a parenchymatous nature. No evidence, indicative of an old abscess, could be found. The red bone marrow was of an exceedingly dark red color, showed distinct hyperplasia and was rather friable and mushy in consistency. The other organs and tissues of the body showed nothing of special interest. Specimens of the spleen, kidney, and bone marrow, which were taken for furthur histologic investigation, were reported upon by Dr. Weingart as follows:

"The kidney showed marked dilatation of many of its capillaries, which are packed with red blood-cells. This condition is present in patchy areas throughout the organ. The convoluted tubules showed cloudy degeneration of their epithelium, and their lumina were in many places filled with granular debris. The glomeruli showed dilatation of their capillaries, which were clogged with red cells, and polynuclear leukocytes were seen in considerable numbers throughout the structure of the glomerulus.

"The spleen showed a similar picture. The sinuses were crowded with red blood-cells. The Malpighian bodies stood out distinctly, and the splenic pulp showed rather marked fibrosis. The reticulum stood out with great distinctness, on account of the thining out of the cells and the dilatation of the sinuses.

"The bone marrow from the central part of the shaft of the femur showed evident hyperplasia. The capillaries were packed with red cells, and among the hematopoietic cells, the megalokarycytes seemed to be especially numerous."

Comments.—In the study of these cases an important clinical fact is gleamed, namely, that splenic enlargement does not necessarily occur in every case of polycythemia associated with chronic cyanosis. True it is that perhaps the untimely death occurring early in the study of Case 1 did not grant sufficient time to determine whether the slight enlargement of the spleen was temporary and that had not death ensued from a vascular complication, distinct splenic enlargement may have later ensued. Suffice it to say, however, that in Case II no increase of the splenic area could be made out antemortem, a physical finding which was amply supported on postmortem examination. The study of Case II thus far warrants the assertion of Geisböck that a second form of polycythemia exists, a form characterized by an absence of splenic enlargement, but in which hypertension and nephritic symptoms play a part subsidiary only to those changes found in the blood tissue itself.

The author feels that the study of these cases will throw but little light on the question as to the influence that lues may play as an etiologic factor. While in both instances the blood Wassermann was negative yet, it will be recalled, a positive reaction was obtained in Case 1 when spinal fluid was used. This finding, however, should not be considered as positive proof that syphilis was the etiologic factor. The author would rather believe that in all probability the presence of a syphilitic infection was a mere coïncidence and that the nervous symptoms early manifested were due to luetic changes in the central nervous system rather than to changes brought about by a vast increase in the number of red blood-corpuscles. While in the absence of autopsy findings it cannot be definitely proven that death in Case 1 resulted from a thrombosis in some portion of the left middle cerebral vessel, yet the absence of hypertension, of hardening of the peripheral arteries, of changes indicative of renal involvement, render the liklihood of hemorrhage rather untenable and favor strongly the theory of

clot formation due to a slowly moving and viscid fluid comparatively rich in those essentials most needed in favoring coagulation.

Just what rôle a strictly vegetarian diet, continued over a period of several years, as in Case II, would play in producing a richness of the hemoglobin content of the red blood-corpuscles, remains to be seen, but it is not unreasonable to assume that the ferruginous content of the blood was, in all probability, greatly increased as a result of such a diet, and the same may have been a greater factor in producing an excess of erythrocytes than ordinarly believed in cases where, for some unknown reason, the hemogenic system is already over-stimulated.

The hemorrhagic oozing from the uterine and gingival mucous membranes in Case II was, in all probability, an effort on the part of nature to bring about a decrease in the hypertension by ridding the human economy of some of its excess blood constituents. It is not illogical, therefore, to assume that such was the case, inasmuch as the bleeding ceased and did not return subsequent to the lowering of the blood-pressure and the reducing of the fluid and corpuscular elements of the blood. The so-called epileptiform attack, which the patient sustained two weeks prior to the time she first came under the author's observation, may best be explained, perhaps, in the light of subsequent developments, on the basis of uremic toxemia. That the convusion was due to some toxic influence, rather than to a cerebral lesion, was amply borne out by an absence, on examination, of any organic lesion of the central nervous system. The uremic convulsions which closed the final scene, however, were distinctly epileptiform in character. The first visible evidence of onset was always manifested by a wide dilatation of the pupils, rotation of the eyes to one or the other lateral extreme, a high pitched cry, followed by a tonic, then later by clonic convulsions, with stertorous breathing and at times sphincter incontinence accompaning the relaxation.

In summing up the symptomatology of the hypertonic form of polycythemia, it would appear that the most reasonable explanation for the occurrence of the symptom-complex made up of definite blood changes, for the increase of arterial tension, and for nephritis, is one that considers each and all of these entities as due to something producing primary changes in the red bone-marrow rather than to a coïncidence in which an individual, suffering from an increase in the red blood-cells, is also suffering at the same time from arteriosclerosis and renal inflammation.

FATAL POISONING FROM BICHLORID OF MERCURY. AUTOPSY AND TISSUE STUDY.

BY JAMES E. DAVIS, A.M., M.D.,

DETROIT, MICHIGAN.

MRS. P., aged 25, died eleven days after ingesting two tablets of bichlorid of mercury and the local application of one tablet to the upper vagina and cervix uteri. The aggregate dose of poison being somewhat less than 5.46 grains (.36 grams).

FAMILY AND PERSONAL HISTORY.—The patient's parental home life was marred by much irritability of temper, but was otherwise negative to the essentials of this report. She began her school life at six years of age and progressed normally in her education until thirteen when she left school and engaged in house work. At eighteen years of age she was married, but lived with her husband only six years. In this period two children were born and six abortions occurred. Her general health had been good except for measles, and pneumonia during her seventeenth year. During the past year mental depression followed domestic troubles and personal immoralities, and suicide was attempted with a razor, but proved unsuccessful.

MORBIDITY:—*First Day.*—At 11 a. m. two tablets of bichlorid of mercury, each containing 1 41/50 grs. were swallowed and one tablet of the same strength was inserted in the vagina and held in position by a tampon. During the afternoon cramps and diarrhea occurred and continued through the second day.

Third Day.—The mouth became sore and reddish patches appeared at different places on the mucosal surface; this was accompanied by swelling and fetid odor of the gums.

Fourth Day.—Slight bleeding from the tongue and gums occurred; there was also slight restlessness and moderate thirst.

Fifth, Sixth and Seventh Days.—All symptoms continued without marked change, but at times a listlessness was noted. This was frequently changed to rather marked restlessness, and pains in the lower abdomen and back became annoying. Urine was secreted in normal amounts and frequently until the seventh day when marked diminution resulted. The output was only one ounce for the day. Catheterization at 7 p. m. proved the urinary bladder to be empty.

Eighth Day.—The symptoms were marked restlessness, frequent bowel movements, some being involuntary, with blood and mucus in the stools; there was also emesis of greenish fluid.

Ninth Day.—Restlessness marked, bleeding from mouth and tongue, expectoration of blood-clots and grayish membrane, emesis of greenish fluid, twitching of hands and arms during sleeping periods.

Tenth Day.—Restlessness marked, insomnia, muscle twitching, emesis frequent, hemorrhage from the bowel profuse with tar-colored stools, hiccough severe.

Eleventh Day.—Symptoms of the previous day continued.

Twelfth Day.—Muscle twitching very frequent, restlessness very marked, vomiting of greenish fluid and blood almost continuous, hemorrhages from the bowel more profuse. Sleeping periods were more prolonged and the patient would waken screaming.

Thirteenth Day.—The symptoms of the previous day were continued with the appearance of mental irrationality.

Fourteenth Day.—Vomiting and diarrhea

decreased; slight twitching and restlessness at times. Mentally semicomatose. Catheterization obtained 200 c. c. of urine (100 c. c. of this quantity when concentrated by evaporation to ½ c. c. gave a trace of mercury).

Fifteenth Day.—Death at 3 a. m.

Autopsy (Seven Hours After Death).—

Sex: Female, aged about 25 years.

Length: Sixty-five inches.

Weight: One hundred twenty pounds.

Hair: Abundant, blonde.

Eyes: Blue—pupils equal.

Ears: Negative.

Nose: Mucosa of nares partly covered with blood.

Mouth: A typical mercuric line on the gums. Areas of ulceration on the buccal mucosa, under side of tongue opposite the sublingual gland ducts and a few small areas on the dorsal surface. The upper jaw exhibited a purplish blue line extending from the labial to the lingual mucosal surfaces.

Vagina: Contained a foul purulent discharge and the mucosa was gangrenous throughout its entire surface. At the left side of the cervix uteri there was a sloughing crater-like area involving the cervix and upper left vaginal mucosa.

Abdominal Cavity: Contained free H_2S and between 200 and 300 c. c. of free fluid in the peritoneal cavity. The entire peritoneum was of a cloudy gray color. The intestines were slightly distended with gas and were of a dark reddish-blue color, excepting in a few areas where the color was a dark reddish-brown. The mesentery was enormously congested and the mesenteric lymph-nodes were all enlarged.

Intestines: The mucosa was of a brown color and loosened easily. The lower end of the jejunum was reddish-brown in color and the mucosa was denuded in several places, making the wall very thin in these areas. The entire intestine showed the same changes in some degree. The cecum was particularly involved while but little change occurred in the transverse colon. The descending colon contained a large amount of blood.

Stomach: The entire mucosa was necrotic and covered with a brown and bloody secretion and the entire wall was markedly dilated.

Duodenum: The mucosa was colored a dark brownish-green and was very necrotic.

Liver: This organ had descended four finger breadths below the sternum in the midline and was of a mottled purple color with small yellowish areas. When sectioned it had a cooked appearance.

Gall-bladder: The lumen was filled with bile and its mucosa was easily denuded.

Spleen: The capsule appeared wrinkled, shrunken and the trabeculæ were very prominent.

Uterus: This was markedly congested and had a sloughed-off area at the left of the cervix extending 15 cm. upward upon the cervial os. The vaginal wall was extensively gangrenous.

Kidneys: These appeared to be markedly swollen. The left one had many petechial subcapsular hemorrhages. The organ had a grayish-blue cooked appearance and was very edemic; the papillæ were so swollen as to occlude the calyces. The right kidney exhibited a severer but similar change to that observed in the left.

Ureters: They appeared to be normal.

Urinary Bladder: The mucosa was hemorrhagic and necrotic. The trigone was almost obliterated and the urethra appeared closed by edema and congestion. There was no urine in the bladder.

Thorax: The tracheal mucosa was severely congested, but not ulcerated. The lungs were normal except for some hypostatic congestion in dependent portions. The heart and pericardium showed only simple congestion. The thyoid gland appeared normal. The esophagus exhibited necrosis of its mucosa, the involvement being much more marked towards the stomach.

Microscopical Changes.—*Gastro-intestinal Tract.*—(1) *Tongue.*—There was slight diffuse inflammation of its epithelial surface, with local denudation and pyogenic infection.

(2) *Esophagus.*—Superficial necrosis and local denudation of its mucosa and some in-

flammatory involvement of the submucosa were in evidence. Near the stomach the changes were most marked, the necrosis involving the submucosa.

(3) *Stomach.*—The muscle protoplasm was blurred, cell nuclei granulated and hyperchromatosed, lymph follicles partially destroyed, and the preserved cell nuclei deeply stained. The general outline of the gastric mucosa was well preserved except that the pits were not seen because of extensive massing from extra chemical and postmortem necrosis. There was a diffuse congestion of the mucosa, but the back to back position of the columns was unusually close. The preservation of parietal and chief cells was generally good. Altogether an extensive active destruction prevailed in the upper portion of the mucosa. The submucosal blood-vessels were markedly congested and in places there appeared some fat necrosis.

(4) *Duodenum.*—The epithelium upon the villi, except occasionally at the bottom of the crypts, was almost completely destroyed. The duodenal glands were hyperemic and catarrhal and there was some solution of the gland epithelium.

(5) *Jejunum.*—The change resembled that of the duodenum, only hyperchromatosis was more marked and destruction of epithelium was less. The submucosa was quite markedly congested, but the lymph-node tissue was very well preserved.

(6) *Ileum.*—The epithelium denudation was similar to the changes in the foregoing sections, only that the process was more severe and ulceration was observed to have extended into the stroma and also through the entire wall. Edema, seropurulent exudation, and enormous distention of submucosal vessels prevailed.

(7) *Large Intestine.*—A much better preservation of mucosa was found here. Some small ulcerations were occasionally observed, also edema, hyperemia and hematoidin pigment.

(8) *Gall-bladder.*—There was an excellent preservation of its folds except for a total loss of epithelium.

(9) *Liver.*—The organ was enlarged, averaging from 1 to 2 lobules per field. The liver cells were uniformly blurred from protoplasmic changes. The nuclei were well preserved, but necessarily disassociated. The bile capillaries were not changed, but the blood capillaries were irregularly distended. Blood-cells in the larger vessels were markedly hemolyzed and the vessel walls showed solution changes in places. Pigment deposition was marked in places, but on the whole was not excessive.

(10) *Pancreas.*—The islet tissue exhibited early solution changes, the nuclei being markedly disassociated. The duct epithelium was hyperchromatic and in places was becoming dissolved.

(11) *Spleen.*—A moderate hemorrhagic flooding obtained throughout.

Urinary System.—*Kidneys*: The entire structure showed enlargement, multiple hemorrhages, multiple emboli, diffuse tubular dilatation, cellular clogging of the short loops, collecting tubules uniformly filled with black pigmented blood in different degrees of changes from early hemolysis to hyalinization, as well as exfoliated tissue cell debris. The glomeruli were unchanged except for a slight hypermia and hypertrophy.

Cardio-vascular Changes.—(1) *Pericardium.*—There were local areas of necrosis, degenerative change and slight inflammatory reaction.

(2) *Heart.*—Slight congestion and fatty degeneration was noted.

(3) *Aorta and Vena Cavæ.*—These were unchanged.

Respiratory Changes.—In both lungs there were marked edema and hemorrhagic infiltration with early consolidation and thrombosis, and slight engorgement of the pleura.

Generative System.—Changes noted here involved necrotic and exfoliative changes of the vaginal mucosa, endometrium and epithelium of the oviducts with a local necrosis of the cervix and multiple embolism. The exfoliated epithelium was extensively granulated and disintegrated. Stromal vessels

were filled with hemolized red blood-cells or emboli. The thyroid gland colloid was markedly changed in its reaction to hematoxylin and eosin stain and the embryonic rest cells exhibited a generalized desquamation.

Summary.—*Symptomatology.*—The principal symptoms are: abdominal cramps and diarrhea, salivation, restlessness, thirst, listlessness, recurrent abdominal and back pains, anuria, recurrent diarrhea and bloody stools, emesis of bile and blood, expectoration of blood and grayish membrane, muscle twitching, insomnia, severe hiccough, mental irrationality, and a semicomatose condition.

Gross Pathology.—(1) Gastro-intestinal Tract.—There are pigmentation of gums, mucosal exfoliation and ulceration, peritoneal congestion and exudation, intestinal wall discoloration and congestion.

(2) Urinary Tract.—Congestion, edema, hemorrhage, and necrosis are marked.

(3) Generative Structures.—Congestion, gangrene and sloughing are always present.

Histopathology.—Inflammation, exfoliation, hemorrhage, ulceration, necrosis and infection of mucosal surfaces is characteristic. There is also local extension of the same changes into deeper tissues with multiple embolism. The large intestine is less involved than the upper tract. A specific involvement of the kidney tubular tissue, by congestion, hemorrhages, emboli and epithelial exfoliation with effectual occlusion of the efferential structure were observed, and there was contiguous and circulatory involvement of other tissues in the foregoing changes.

111 Josephine Ave.

TRIPLE EMPYEMA

BY F. F. GUNDRUM, A.B., M.D., F.A.C.P.,

SACRAMENTO, CALIFORNIA.

DOUBLE empyema is not very uncommon. Its occurrence is given as about 2 per cent of all empyema by Lord[1], 4.3 per cent by Fabrikant[2], and 3 per cent by Lillienthal[3]. This is a larger figure than one would expect from the clinical literature, which is somewhat sparse. Fabrikant[2] collected 118 cases from 1822 to 1911 and Mackenzie[4], 140 cases in 1914.

So far as the author has been able to survey the literature, a triple empyema has not been reported. The case summarized herewith seems unique. There developed three separate empyemata, two on the left side and one on the right side; these were followed by clinical recovery.

CASE REPORT.—J. J. Age 26; male; single; discharged from the U. S. Navy about six months previously because of hyperthyroidism; admitted to the White Hospital, November 20, 1919.

Present Illness.—Four days; onset sudden with chill; fever; cough; pain in the left lateral thorax.

Physical Examination.—Consolidation of left lower lobe of lung; slightly enlarged thyroid; some tremor of fingers; pulse about 140 (although temperature only 102° F. (38.89° C.); slight exophthalmos; white blood count 20,000; sputum-pneumococcus, Type 4.

Clinical Course ("days" refers to days in hospital):

Third day, right lower lobe consolidated.

Fourth day, very active delirium; patient rose from bed and broke a window.

Fifth day, restraint necessary.

Sixth day, temperature dropped; crisis.

Eighth day, temperature normal all day.

Ninth, tenth, eleventh and twelfth days, morning remission, afternoon fever.

Thirteenth day, exploratory puncture, thick, yellow pus, both bases. At this time the author was unfamiliar with the work of Mackenzie[5], Lillienthal[3], Fabrikant[2], Corner and Grant[6], Carr[7], and Lund and Morrison[8], who have shown that a bilateral, open, thoracostomy may be safely done upon empyema cases. The pleural adhesions already formed suffice to prevent lung collapse. The author's surgical consultant shared his ignorance, and advised against open drainage, partly no doubt, because of the desparately ill condition of the patient.

Fourteenth day, aspirated 500 c. c. left base.

Fifteenth day, first *x*-ray plate showed right base clouded to sixth rib, left base to eighth rib. The cloud in the left upper was supposed to have been consolidation.

Sixteenth day, 1200 c. c. pus was aspirated from right base; cocain anaesthesia; severe shock; novocain substituted; no further trouble.

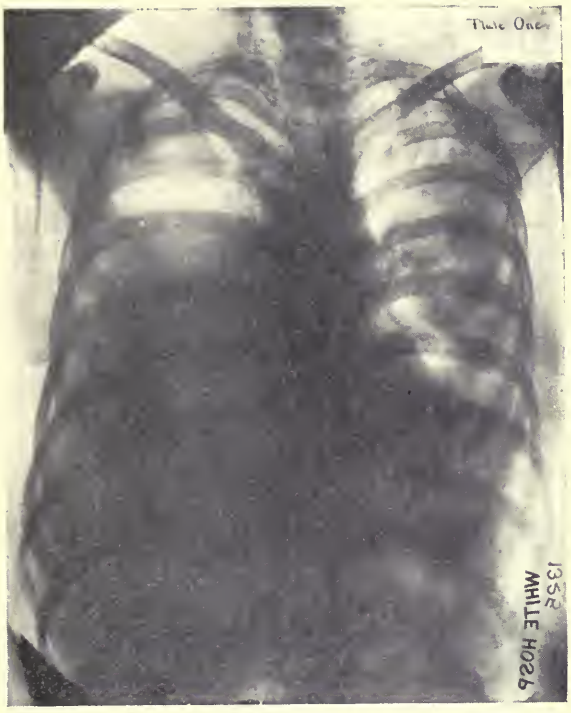
Eighteenth day, 500 c. c. aspirated from left base. The second *x*-ray plate, taken on this day, showed both bases clouded right to the seventh rib, left to the ninth, with an unappreciated clouding in the left upper also. The patient had meanwhile improved considerably in strength, ate well during the morning remission, and had less lofty temperature rise in afternoon.

Twentieth day, 1700 c. c. aspirated from right base.

Twenty-first day, 800 c. c. aspirated from left base.

Twenty-second day, 750 c. c. aspirated from right base.

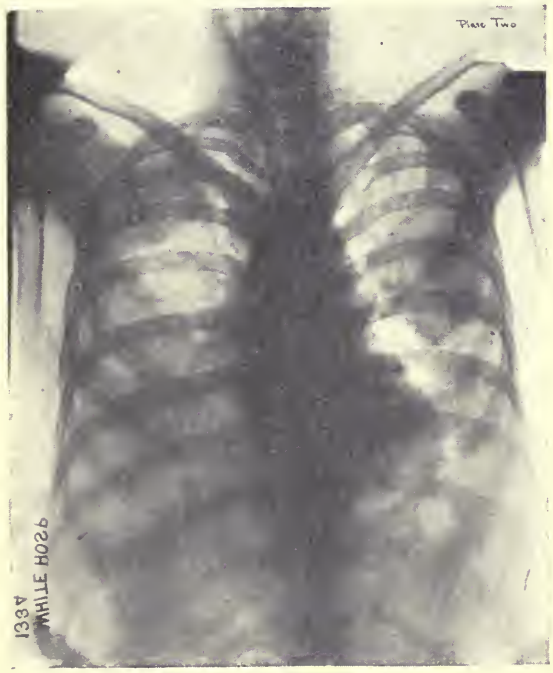
Twenty-third day, 200 c. c. aspirated from left base.



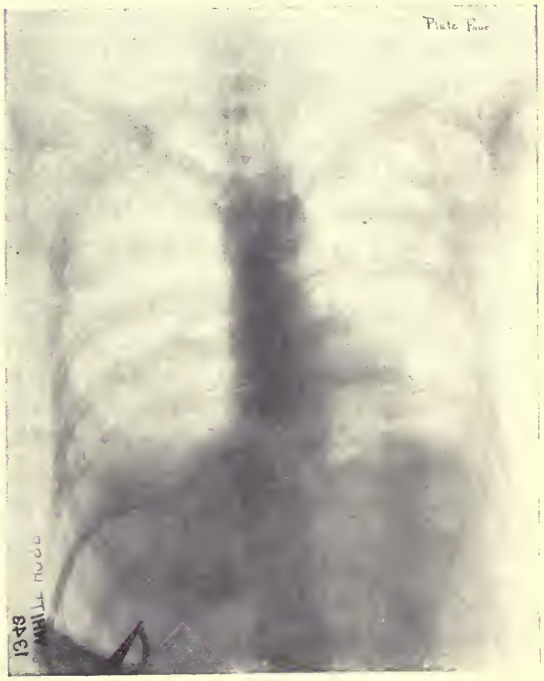
First Plate: Shadows at both bases and in left upper, the latter being thought due to consolidation.



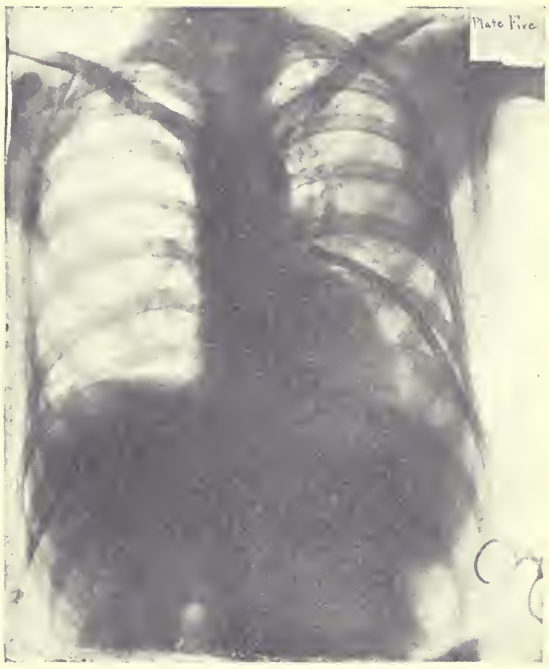
Third Plate: Right pleural cavity well drained by catheter shown in place. Left base nearly clear. Quite dense shadow opposite fifth, sixth, and seventh interspaces.



Second Plate: Shadows all less extensive, but occupy approximately the same areas.



Fourth Plate: Chest almost clear. 50 c. c. of pus daily from catheter at right base. Temperature down.



Fifth Plate: A catheter in each side. That on the left did not reach the pus sought. There is no pneumothorax.

Twenty-fifth day, the trocar was thrust through the tenth right interspace under novocain anaesthesia, a number 18 Fr. catheter was introduced and left *in situ* after withdrawal of trocar; 650 c. c. pus were obtained by attaching an aspirator to the catheter. This catheter was kept clamped, and the clamp was removed and aspiration done twice daily for twenty-one days. The amount of pus gradually diminished. No pus was obtained after the twenty-first day, and the catheter was removed on the twenty-fourth day. The wound healed solidly in three days.

Twenty-eighth day, left base aspiration dry. Right base had free catheter drainage twice daily; the patient still had, however, a septic type of temperature. A third *x*-ray plate showed bases fairly clear with still a cloudy area on the left about opposite the interlobar septum.

Twenty-ninth day, exploratory puncture left sixth interspace, 50 c. c. pus.

Thirtieth day, aspiration left base ninth interspace, 50 c. c. pus.

Thirty-first day, aspiration left upper at sixth interspace, 160 c. c. pus.

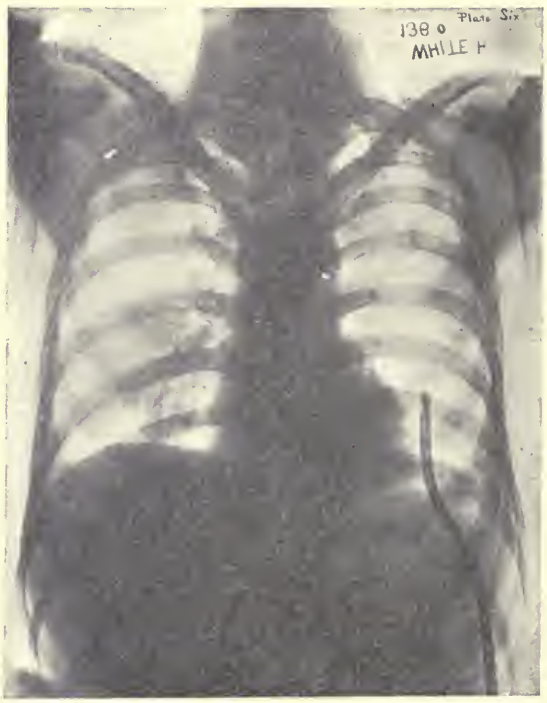
Thirty-third day, left upper, 115 c. c. pus.

Thirty-fourth day, left lower, 75 c. c. pus. The fourth *x*-ray plate taken on the thirty-fourth day showed a much clearer chest. There was clouding at the left base and some at the right base. The catheter in place yielded from 30 to 50 c. c. pus a day. Likewise, the temperature curve flattened out for a few days, making it appear as though purulent accumulations were possibly finally drained.

Thirty-fifth day, left upper dry tap. Personal illness prevented the author from seeing the patient from the thirty-fifth to the fourtieth days, during which period, a septic type of fever curve returned.

Fortieth day, left upper aspirated, 100 c. c.; left lower dry; right lower (catheter), 30 c. c. pus.

Forty-second day, the nurse reported that the fever was still up. The author



Sixth Plate: Right lower and left upper collections drained. Catheter draining left base.

was again ill, so requested a surgeon colleague to introduce a catheter into the left upper collection as that seemed to be the cause of the fever. This puncture did not reach the pus sought, and was much complained of by the patient.

Forty-fourth day, the fifth *x*-ray plate was made and showed both catheters in place and illustrated the air-tight passage though the chest wall. The catheter on the right had then been in place nineteen days, but no pneumothorax, great or small, was seen. The left base was still clouded.

Forty-fifth day, left tube was withdrawn. The wound healed in four days.

Forty-eigth day, left upper dry tap; left lower 30 c. c. pus; right lower (catheter) dry.

Fiftieth day, trocar-catheter was introduced through the left tenth interspace and 175 c. c. pus were withdrawn. Right catheter was withdrawn. From the fiftieth to the fifty-sixth day, pus was obtained from the left base in diminishing amounts. Fever was absent after the fifty-first day.

Sixty-first day, the sixth *x*-ray plate was taken. It showed the chest to be quite clear. The left lower catheter was in place, but there was no pneumothorax.

Sixty-fourth day, left lower catheter was withdrawn, and there was an uneventful recovery.

The patient still shows slight struma, tremor, tachycardia, and exophthalmos. He feels that he has had enough hospitalization, and will postpone action in regard to his hyperthyroidism to a later time.

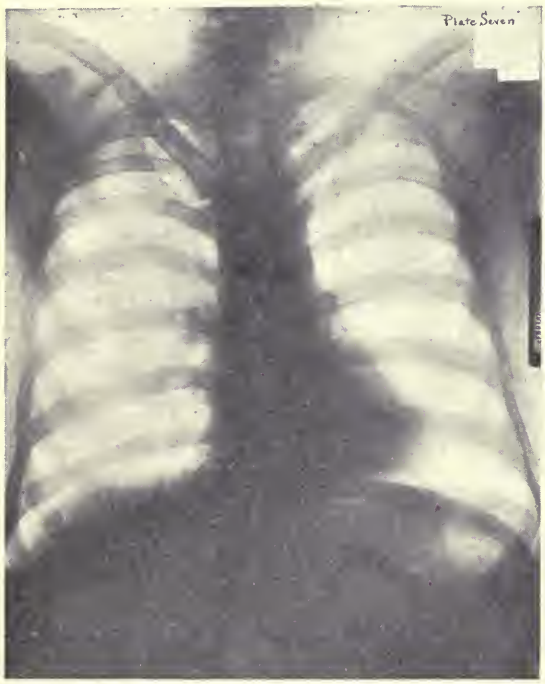
Four months after discharge from hospital, the seventh *x*-ray plate was taken; this showed a remarkably clear chest.

Summary.—This patient had double lobar pneumonia followed by empyema in three separate cavities as follows:

(1) Right lower: free pus in pleural cavity; from this zone 6462 c. c. pus were removed by needle and catheter during thirty days.

(2) Left lower: free pus in pleural cavity; from this zone 2427 c. c. pus were obtained by needle and catheter during a period of forty-three days.

(3) Left upper, interlobar: reached through the sixth interspace and from this zone 425 c. c. of pus were aspirated with a needle over a period of eleven days.



SEVENTH PLATE: Four months later. Chest very clear throughout.

REFERENCES

1. LORD: Diseases of Bronchi, Lungs, and Pleura, 1915 Edit., p. 520.
2. FABRIKANT: *Deut. Ztschrft. f. Chirurg.*, 1911, Bd. 108, p. 584.
3. LILLIENTHAL, H.: *Transact. Amer. Surg. Assn.*, XXXV, 355.
4. MACKENZIE: *Boston Med. & Surg. Jr.*, Sept. 10, 1914, clxxi, No. 11, p. 424.
5. MACKENZIE: *Transact. Amer. Surg. Assn.*, XXXII, 659.
6. CORNER AND GRANT: *Proceed Royal Soc. of Med.*, London, 1912, v, 90.
7. CARR: *Clinical Journal*, London, March 31, 1915, p. 110.
8. LUND AND MORRISON: *Boston Med. and Surg. Jr.*, Oct. 26, 1916, p. 606.

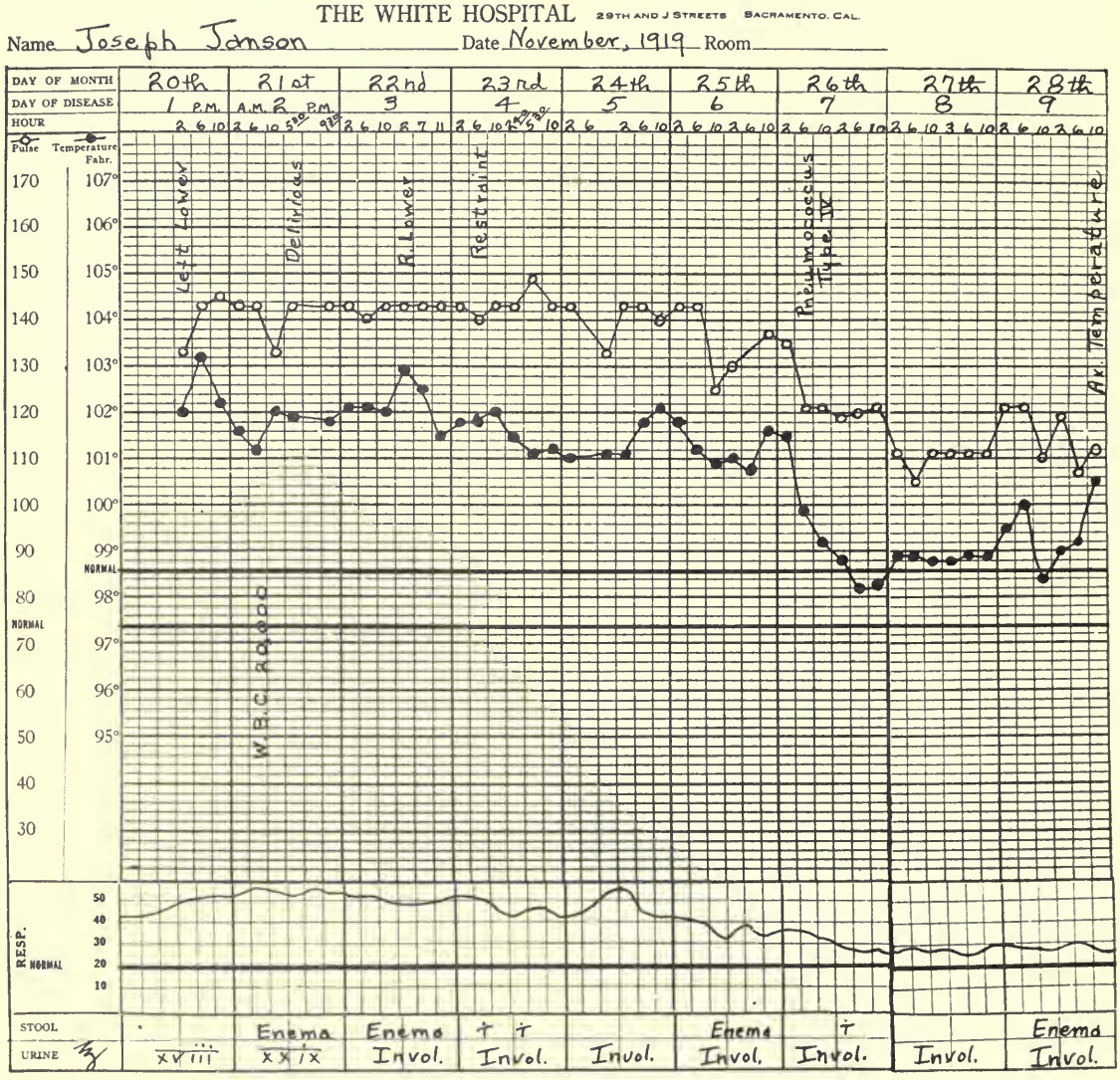


Chart I. (The Large Numerals on the Following Charts Indicate the Taking of *X*-Ray Plates).

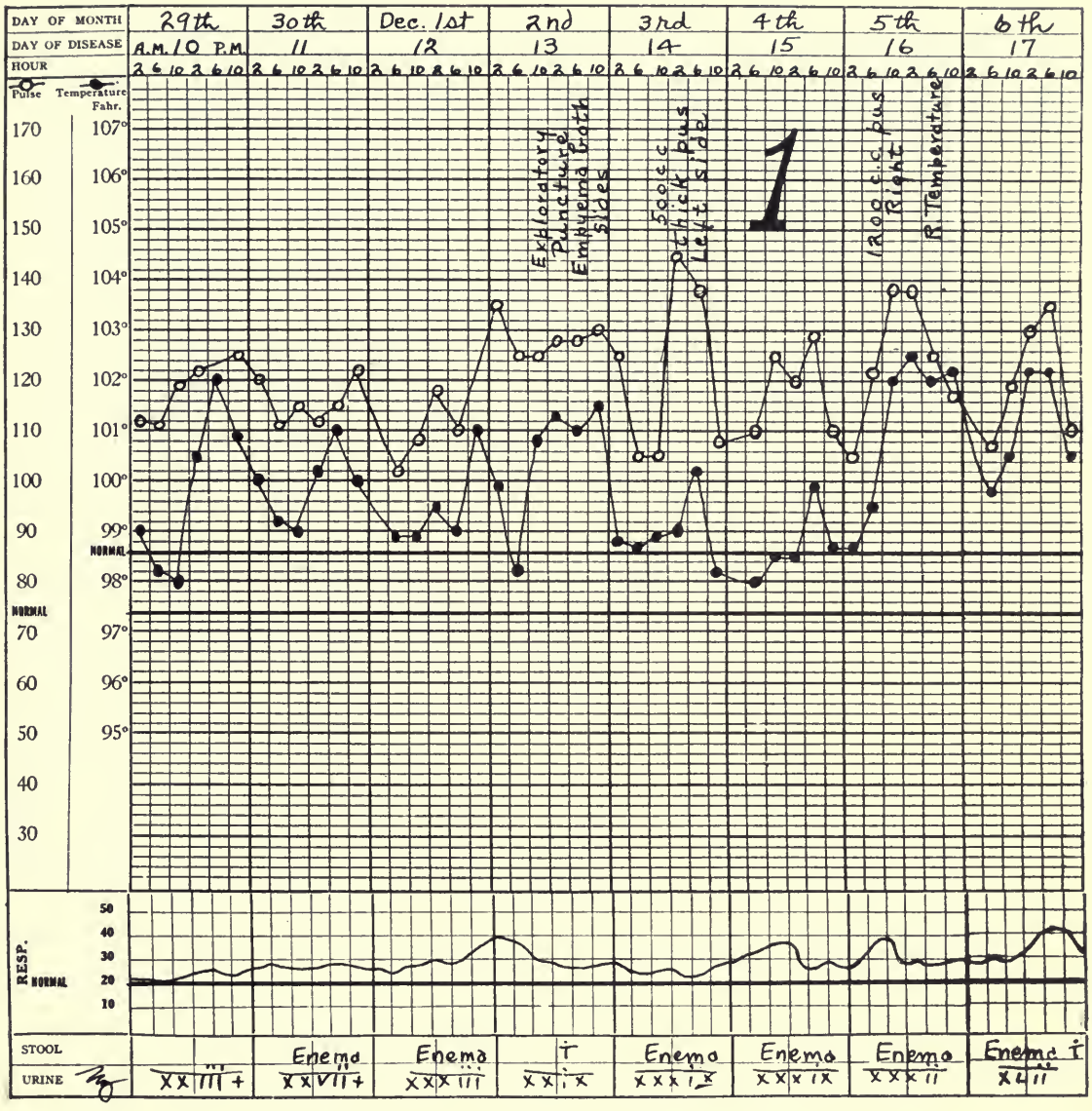

DAY OF MONTH
DAY OF DISEASE
HOUR
Pulse
Temperature Fahr.
29th
30th
Dec. 1st
2nd
3rd
4th
5th
6th
A.M. 10 P.M
11
12
13
14
15
16
17
Exploratory Puncture Empyema both sides
500 c.c. Thick plus Left side
1
1200 c.c. plus Right
R Temperature
RESP.
NORMAL
STOOL
URINE
Enema
Enema
Enema
Enema
Enema
Enema
Enema

CHART II

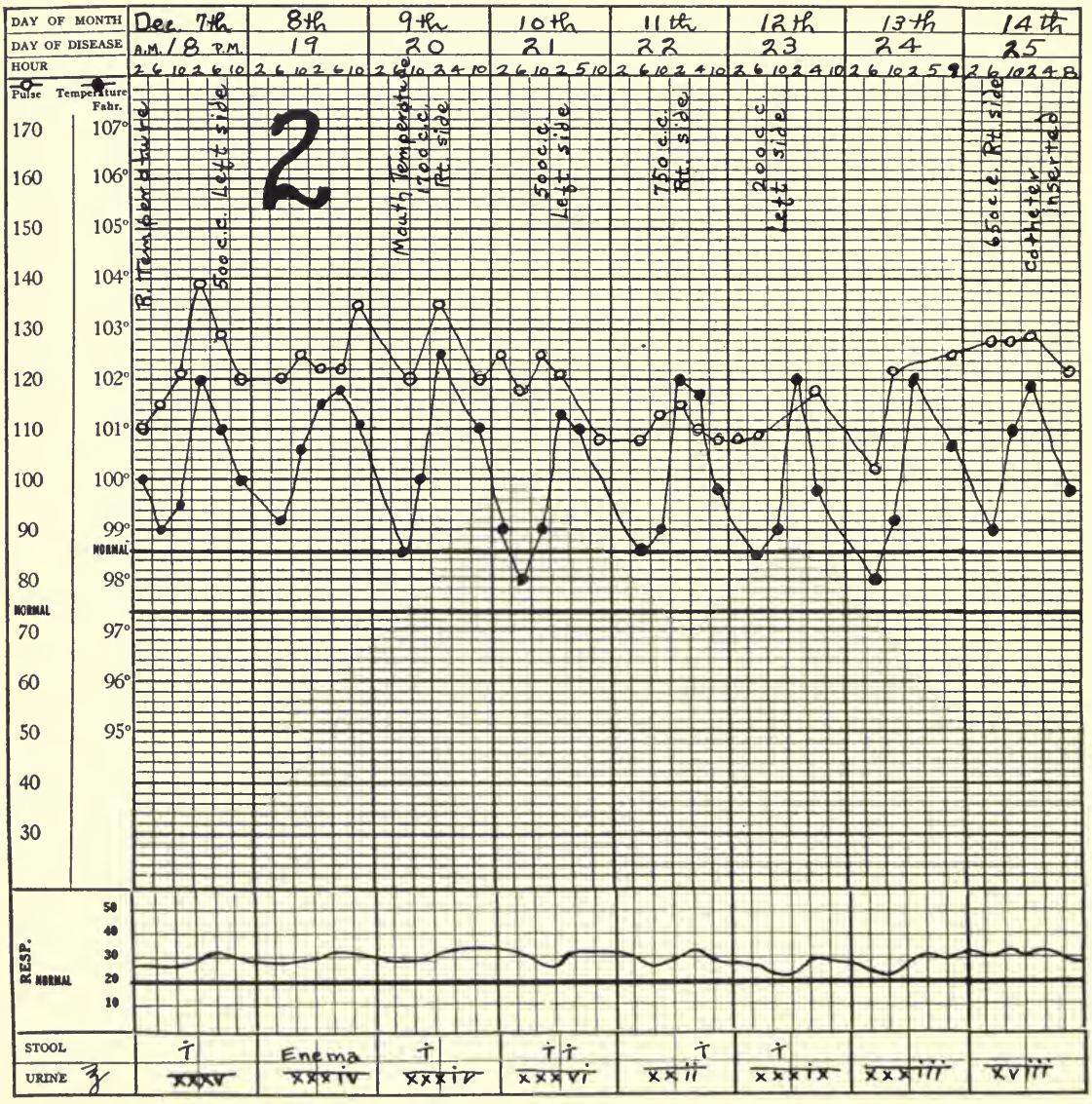

DAY OF MONTH
DAY OF DISEASE
HOUR
Pulse
Temperature Fahr.
Dec. 7th
8th
9th
10th
11th
12th
13th
14th
A.M. 18 P.M.
19
20
21
22
23
24
25
R. Temper 4 hrs
500 c.c. Left side
Mouth Temperature
1100 c.c. Rt. side
500 c.c. Left side
750 c.c. Rt. side
2000 c.c. Left side
650 c.c. Rt. side
Catheter Inserted
RESP.
NORMAL
STOOL
URINE
Enema

CHART III

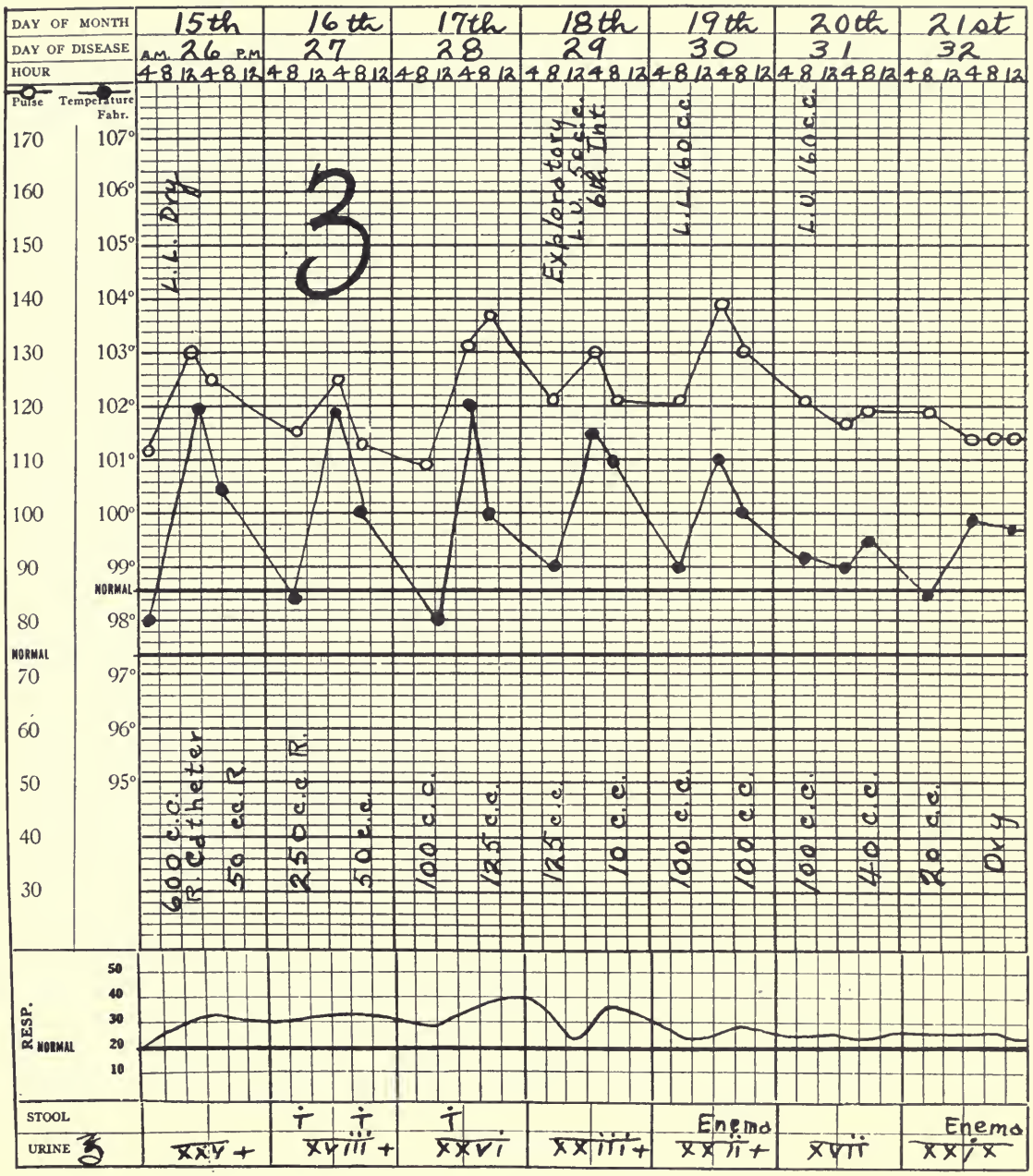

DAY OF MONTH
DAY OF DISEASE
HOUR
Pulse
Temperature Fahr.
15th
16th
17th
18th
19th
20th
21st
AM. 26 PM
27
28
29
30
31
32
4 8 12 4 8 12
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
107°
106°
105°
104°
103°
102°
101°
100°
99°
98°
97°
96°
95°
NORMAL
L.L. Dry
3
Exploratory L.U. Sec. i.e. 6th Int.
L.L. 160 c.c.
L.U. 160 c.c.
600 c.c. R Catheter
50 c.c. R
250 c.c. R.
50 c.c.
100 c.c.
125 c.c.
125 c.c.
10 c.c.
100 c.c.
100 c.c.
100 c.c.
40 c.c.
20 c.c.
Dry
RESP.
50
40
30
20
10
NORMAL
STOOL
URINE
Enema
Enema

Chart IV

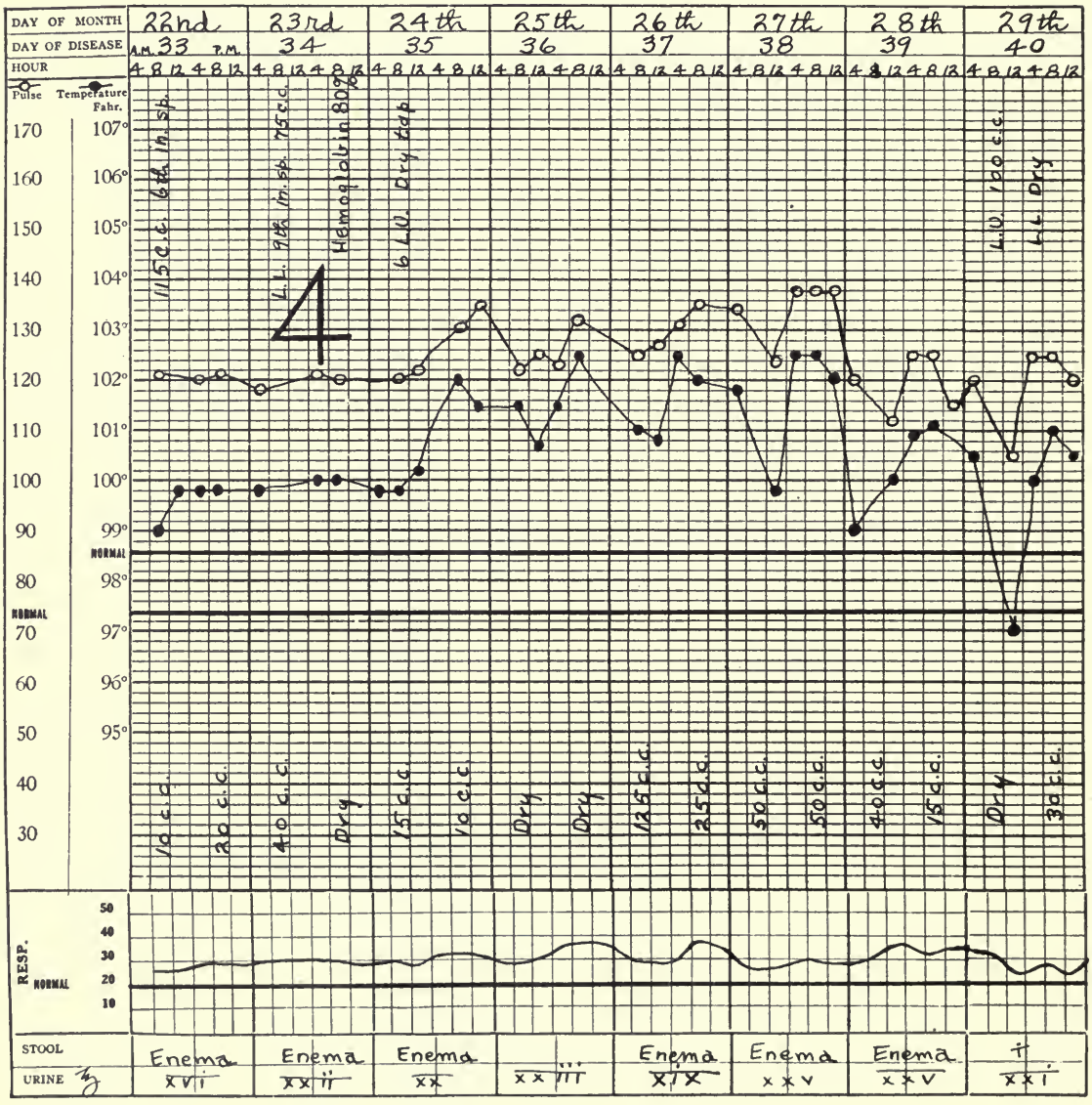

DAY OF MONTH
22nd
23rd
24th
25th
26th
27th
28th
29th
DAY OF DISEASE
A.M. 33 P.M.
34
35
36
37
38
39
40
HOUR
4 8 12 4 8 12
Pulse
Temperature Fahr.
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
107°
106°
105°
104°
103°
102°
101°
100°
99°
98°
97°
96°
95°
NORMAL
Hemoglobin 80%
4
RESP.
50
40
30
20
10
NORMAL
STOOL
URINE
Enema
XVI
Enema
XXII
Enema
XX
XXIII
Enema
XIX
Enema
XXV
Enema
XXV
II
XXI

CHART V

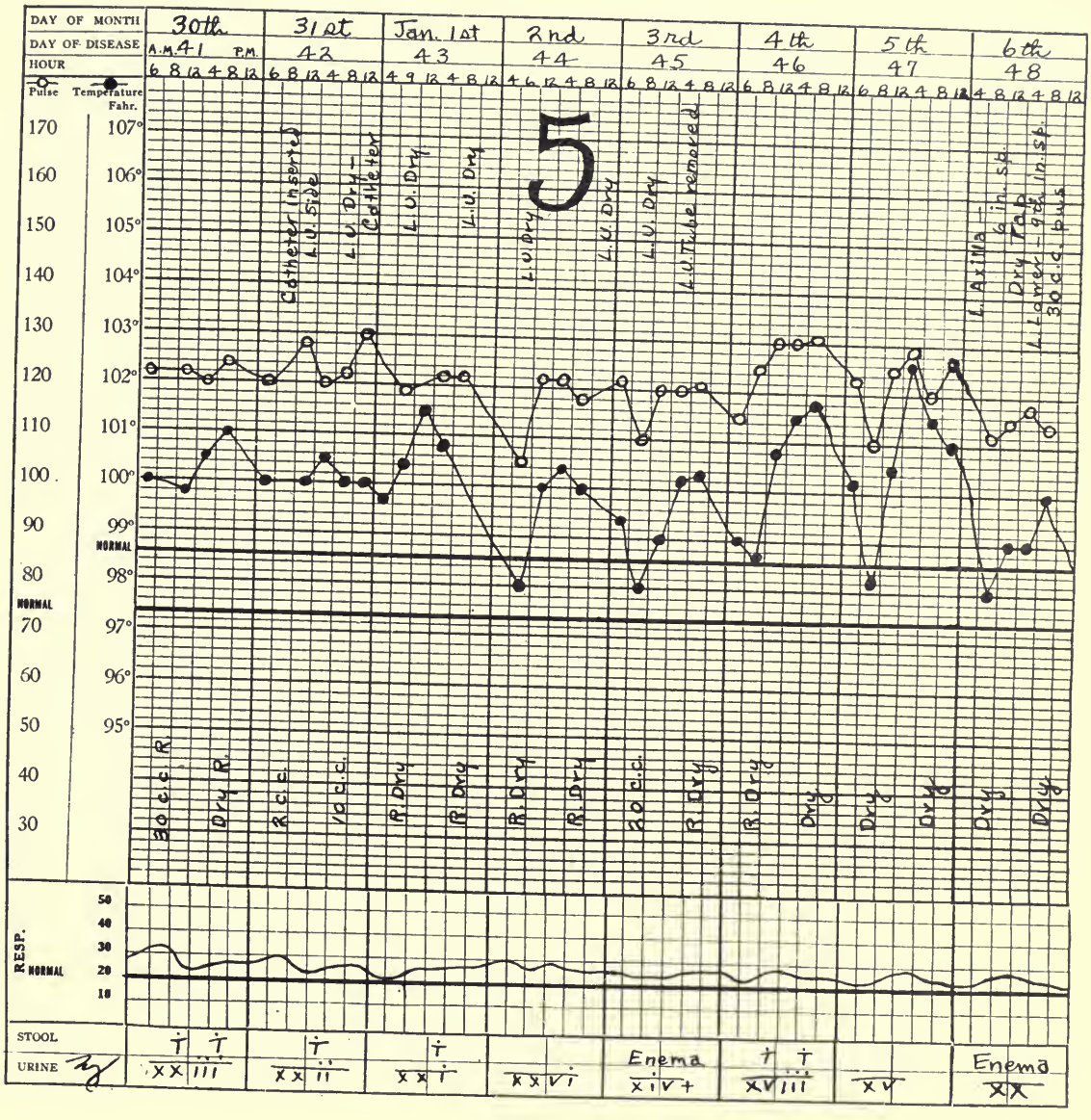

DAY OF MONTH
DAY OF DISEASE
HOUR
Pulse
Temperature Fahr.
30th
31st
Jan. 1st
2nd
3rd
4th
5th
6th
41
42
43
44
45
46
47
48
5
Catheter inserted L.U. Side
L.U. Dry — Catheter
L.U. Dry
L.U. Dry
L.U. Dry
L.U. Dry
L.U. Tube removed
L. Axilla — 6 in. s.h.
Dry. P.P.
L. Lower — 9th in. s.h.
30 c.c. B.W.S.
30 c.c. R
Dry R
R. C. C.
10 c.c.
R. Dry
R. Dry
R. Dry
R. Dry
20 c.c.
R. Dry
R. Dry
Dry
Dry
Dry
Dry
Dry
RESP.
STOOL
URINE
Enema
Enema

CHART VI

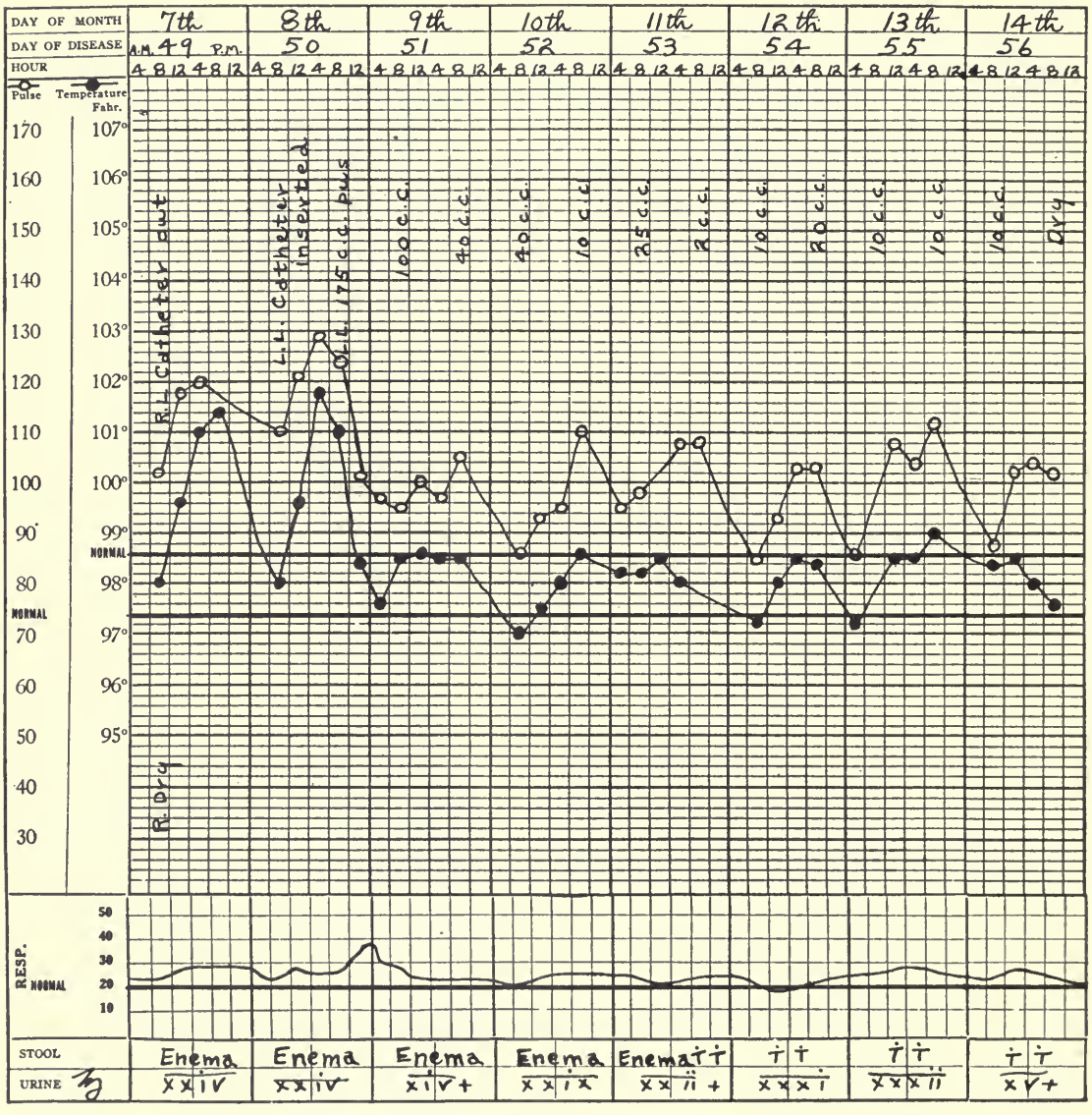

DAY OF MONTH
DAY OF DISEASE
HOUR
7th
8th
9th
10th
11th
12th
13th
14th
A.M. 49 P.M.
50
51
52
53
54
55
56
4 8 12 4 8 12
Pulse
Temperature Fahr.
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
107°
106°
105°
104°
103°
102°
101°
100°
99°
98°
97°
96°
95°
NORMAL
R. Catheter out
L.L. Catheter inserted
O.E. 175 c.c. plus
100 c.c.
40 c.c.
40 c.c.
10 c.c.
25 c.c.
R. Dry
10 c.c.
20 c.c.
10 c.c.
10 c.c.
Dry
RESP.
50
40
30
20
10
NORMAL
STOOL
URINE
Enema
Enema
Enema
Enema
Enema
xx iv
xx iv
xi v +
xx ix
xx ii +

CHART VII

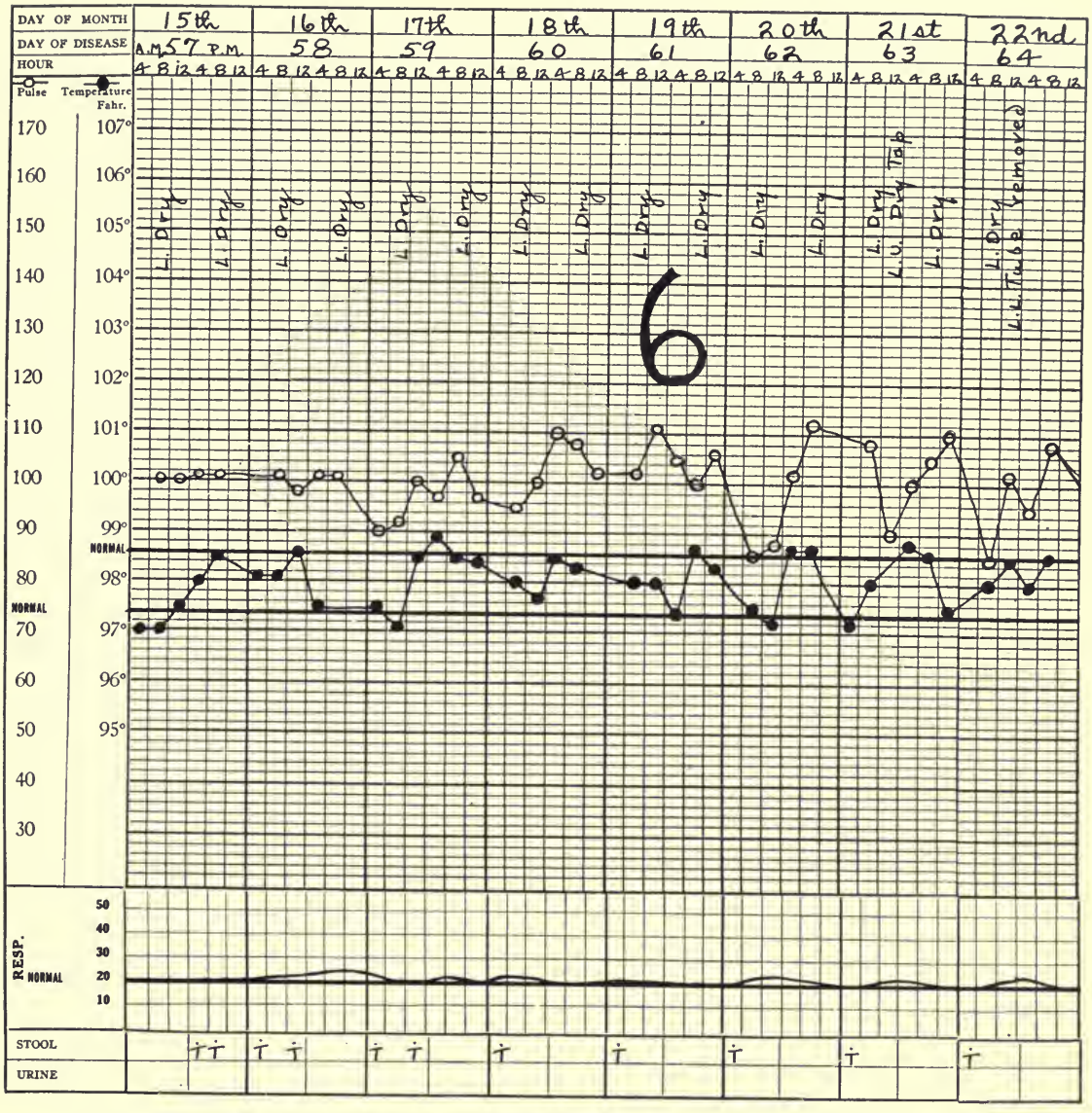

DAY OF MONTH
DAY OF DISEASE
HOUR
Pulse
Temperature Fahr.
15th
16th
17th
18th
19th
20th
21st
22nd
A.M. 57 P.M.
58
59
60
61
62
63
64
4 8 12 4 8 12
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
107°
106°
105°
104°
103°
102°
101°
100°
99°
98°
97°
96°
95°
NORMAL
L. Dry
L.O. Dry
L.O. Dry Tap
L.L. Tube removed
RESP.
50
40
30
20
10
NORMAL
STOOL
URINE

CHART VIII

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ABSTRACTS
OF CURRENT LITERATURE

THERAPEUTICS

FREEMAN, R. G.: Use of Fresh Vaccines in Whooping Cough. *Medical Record*, Nov. 6, 1920, xcviii, No. 19, p. 762.

Vaccines have been used in the treatment of whooping cough for some time with varying results. In the past the author has observed little improvement following their use.

An article by Dr. Hueneken on the application of the complement-fixation test for the detection of antibodies after the injection of whooping-cough vaccines, reported that the antibodies were not present unless the vaccines were freshly prepared, and that after a week of storage but little antibody production resulted from their injection, even in large doses. It occurred to the author that the varying results obtained in the therapeutic use of vaccines might depend upon the age of the vaccine. It has been shown that gonococcus vaccine loses 30 per cent of its efficiency in two days, and that the immunizing properties of tuberculin vaccine deteriorate on keeping.

The author used vaccines, old and fresh, in his practice, and reports the results in each case. To summarize, "in 16 children with whooping cough in which the vaccines were used at various periods of the disease, in 5 no results were obtained. Of these 5 children 3 were early in the disease and the other 2 very late."

"Of the 11 remaining cases, in 9 a very material improvement took place and in four of these a practical cure was obtained."

"Of the 5 cases in which prophylactic doses were used 2 were successful and 3 failed."

His confidence in the vaccines was somewhat shaken by the fact that in one family all 6 children treated failed to react, but the good results obtained in the other cases, especially in beginning cases, have convinced him that "fresh vaccines should have an extended use, particularly in institutions where controls may be used to demonstrate whether we may not have in these vaccines a valuable method of reducing the large mortality from whooping cough."

"The dosage used in all the above cases was one-half billion for the first dose, one billion for the second dose, and two billion each for the third and fourth doses."

To give the vaccines a really conclusive trial, there should be a laboratory producing vaccines every week.

KROPAC, R.: Decapsulation of Kidney in Hopeless Cases of Eclampsia (Die therapie der Eklampsia mit besonderer Berucksichtung der Nievendeksulation in Hoffnungslossen Zuolanden). *Zentralblatt für Gynakologie*, Sept. 4, 1920, 1011.

Report of a case which showed early symptoms which improved with rest in bed and a vegetable diet. Labor began normal-

ly but after nine hours convulsions began. There were sixteen attacks in thirty-two hours. Decapsulation of the kidneys was done after blood-letting and other measures failed. The patient recovered. Two slight attacks occurred after operation.

HUBERT, E. H.: The Treatment of Eclampsia in the Gynecological Clinic of the University of Gottingen in the Years 1910-1919. Inaugural Dissertation, 1919 (Die Behandlung des Ecklampsia an des Frauenklinik des Universitat Gottingen in den Jahren 1910-1919. Inaug. Diss. Gottingen., 1919). *Zentralblatt für Gynakologie*, Sept. 4, 1920, 1011.

There were 66 cases in 4,617 births, i. e., 1.42 per cent. During the war the frequency diminished one-third but the mortality of the mothers increased from 12.25 to 35.29 per cent. It was five times more frequent in first than in subsequent pregnancies. Ninety-two and four tenth per cent occurred before or during labor; 7.5 per cent after labor. The mortality was 18.8 per cent for mothers, and 30.4 per cent for children. The mortality in operations was 20 per cent for mothers, and 25 per cent for children; in Stroganoff therapy 8.3 per cent for mothers, and 33 1/3 per cent for children. In combined operations and Stroganoff therapy 24.2 per cent of mothers and 45.4 per cent of children died. Combined Stronganoff therapy and bleeding gave 33 1/3 per cent mortality for mothers and 28.5 per cent for children.

Early delivery (within the first two hours after the first convulsions) gave mortality of 23 per cent for mothers, and 14.8 per cent for children. Late delivery, 15 per cent for mothers, and 40.4 per cent for children.

HUEGLI, A. G.: Vaccines in General Practice. *Medical Record*, 1920, xcviii, 813.

Vaccine therapy is of inestimable value in producing immunity against diseases and in lessening the severity of attacks, particularly in the early stages. Colds, otitis media, quinsy, tonsillitis, pneumonia, pleurisy, typhoid fever, inflammatory rheumatism, etc. respond very favorably to this form of treatment. The use of vaccines does not preclude any other proper medical or surgical procedure. They should be studied and employed by the general practitioner, not merely by the specialist. It is better to start with a small dose and gradually increase it to the height of tolerance,—severely acute conditions tolerate large doses well. The reaction following the injection is a guide as to the extent of the immunity established. Stock vaccines are far more available than autogenous vaccines and are sufficiently reliable. Polyvalent vaccines are advisable because an infection is seldom caused by a single specie of germs. Concomitant bacteria are always involved. This view is supported by Prof. J. O. Polak, (*Jour. Amer. Med. Assn.*, 1911, lvii, 1739): "Autogenous vaccines of a single strain have given me unreliable reactions. Mixed vaccines of reliable laboratories have given better results than when a single variety was used. This has been shown repeatedly in the blood-picture. When an autogenous vaccine of single strain used in large doses, even up to 500,000,000 has failed to increase the leukocyte count or diminish the polynuclear percentage, the mixed vaccines of several strains have promptly produced a marked leukocytosis. One characteristic which has been noted throughout all of our experience is that, even before any definite effect has been noted on the temperature, the well-being of the patient has seemed to be improved by vaccine injections."

Colds.—Immunizing injections are of great value against repeated attacks of colds and the possible extension of the disease into other channels. Nasal discharges contain chiefly the streptococcus, staphylococcus, pneumococcus, and micrococcus catarrhalis. Consequently small doses of mixed vaccine containing these bacteria should be administered at intervals of four or five days. This method of treatment produces a speedier

convalescence and eliminates drugging almost entirely.

Young adults suffering from recurring attacks of tonsillitis are markedly benefitted by immunotherapy, while old people afflicted with practically chronic bronchitis are immeasurably relieved.

The author strengthens his position by comparing the results he has secured with and without the employment of vaccine therapy. He pronounces it harmless, and finds that it raises vital resistance, lessens the severe symptoms of disease and aids in securing more rapid convalescence.

Fraser, A. R., and Duncan, A. G. B.: Treatment of Diphtheria Carriers with Detoxicated Klebs-Löffler Vaccine. *Lancet*, 1920, ii, 994-998.

The writers report 3 cases showing the results obtained. They hold that the length of time during which these cases were carriers of virulent bacilli is important. Since vaccines when given in sufficient doses can have such a marked effect on the virulence of the organism or on the organism itself in such difficult cases they will certainly cure convalescents where resolution is delayed. It is generally conceded that the convalescent with an otherwise unhealthy nasopharynx is most prone to become a chronic carrier. Here is a point in common in the 3 cases reported. In the first a nasal polypus, in the second congenital syphilis, and in the third a gunshot wound. The first had an attack of diphtheria, while the other 2 had not. In spite of these ideal conditions for bacterial growth, disappearance of the virulent diphtheria bacilli followed detoxicated vaccine treatment. Other organisms with the same morphology, but non-pathogenic, could still flourish on the site, as a mixed vaccine was not used. Exactly what determines the chronicity of carriers is not yet by any means clear. We are still unaware of the mechanism whereby the convalescent with delayed resolution becomes free. In spite of a multitude of varied efforts, no certain means of clearing up chronic carriers has yet been evolved. The cure of carriers is the most hopeful form of prophylaxis. One would expect the vaccine to confer more or less protection on those exposed to infection. Here one has, then a method of promising efficiency in dealing with contacts, convalescents, and carriers. Antitoxin protects only from the toxin produced by the living Klebs-Löffler bacilli in the tissues. The vaccine prevents the growth and life of the bacilli. In a case of diphtheria both vaccines and antitoxin should be given. The advantages of dosage allowed by employing detoxicated vaccine must not be overlooked.

The authors injected this vaccine subcutaneously and intravenously in doses from 200,000 to 350,000 millions. In one case eleven doses were given during about six weeks, at four-day intervals. The first dose of 0.05 c. c. should contain 5,000 million bacilli. On the fourth day another large dose should be given. The twelfth and final dose, given on the forty-fifth day, 3.5 c. c., should contain 350,000 bacilli.

Editor's Answer: Queries and Minor Notes. Question from L. J. Smith, M. D., Health Officer, Wilson, N. C. *Journal of the American Medical Association*, Nov. 13, 1920, lxxv, 1361.

Vaccines for Common Colds.—There is no scientific evidence that common colds can be prevented by the use of vaccines. They are caused by various organisms and are contagious. The organisms causing small epidemics differ so that it is impossible to anticipate which one is about to invade a household or community. The inoculation with mixed vaccines to provide against several possible invaders fail to produce sufficient immunity against infection. Completely controlled experiments show that colds occur in as large a proportion in the inoculated as in the uninoculated. During the war, the inoculation of troops with vaccines containing a large number of pneu-

mococci reduced the incidence and mortality of pneumonia. With regard to superficial infections of the nasal and pharyngeal mucous membranes with diverse etiology, practical results do not bear out theoretical considerations.

MARTINDALE AND WESTCOTT: Tuberculin A. F. (Albumose-Free). *Extra Pharmacopoeia,* 17th ed., 1920, i, 886.

The initial dose of Tuberculin A. F. is 0.00001 c. c. in pyrexial cases; and 0.0001 c. c. in apyrexial cases. Subsequent doses are determined from a study of the resulting reactions—constitutional, or general and focal. As a general rule reactions of any magnitude should be allowed to subside before a fresh injection is given. A light amber colored liquid, the product of a 4 to 6, makes old culture of the tubercle bacillus in an albumose-free medium containing inorganic salts and citrates, the sole nitrogenous food being asparagin. This preparation, as already indicated, may well replace old tuberculin. It is used as diagnostic subcutaneously by conjunctival, intracutaneous and percutaneous application. For treatment it is employed subcutaneously where a fold of skin and under lying tissues can be raised. Reactions obtained are thought to be specific, and anaphylactic symptoms are excluded in consequence of the absence of nonspecific proteins. (Manufactured by Meister, Lucius and Brüning, Limited, No. 3 Jewry Street, London, England).

HOXIE AND MORRIS: Adrenalin in Asthma. A Case of Chronic Adrenalism. *Endocrinology,* Jan.-March, 1920, iv, 47.

History of a case of six years adrenalin administration of approximately 7 c. c. (1.89 fluidrams) a day, mostly hypodermic. After sudden death autopsy showed tremendous engorgement of capillaries and venules of intestinal villi. Slight aortic sclerosis.

GITTINGS, J. C.: Clinical Symptoms and Treatment of Acidosis in Early Life. *Therapeutic Gazette,* July 15, 1920, xliv, 461.

Gittings recommends in the treatment of severe acidosis in children that 4 per cent solutions of bicarbonate of soda should be given intravenously. The amount of fluid to be used in intravenous injections is generally based upon an allowance of fluid equal to 1/60 of the body weight. In the presence of marked dehydration, slightly larger amounts are permissible, but the injections must always be made slowly. In infants the longitudinal sinus usually offers the easiest route, but the veins of the scalp, the external jugular or the femoral may be used. In the use of sodium bicarbonate by the sinus, not more than from 75 to 100 c. c. (2.53 to 3.38 fluidounces) of a 4 per cent solution should be injected, in from five to ten minutes; in older children, two or three times this amount. In other veins, large amounts may be used as indicated.

MACHT, D. I.: On the Use of Benzyl Benzoate in Persistent Hiccough. *Medical Record,* July 24, 1920, xcviii, 146-147.

It is stated by Macht that not only is benzyl benzoate a useful remedy in the treatment of persistent hiccough, but is also of a diagnostic interest in differentiating between the hiccough of a purely central origin on the one hand, and a hiccough which is due to some peripheral origin on the other. Inasmuch as benzyl benzoate exerts its chief effect peripherally on the smooth muscle structures, he is inclined to believe that this drug may be most useful in the treatment in cases peripheral in origin. The benzyl benzoate exerts its action best when given in a 20 per cent solution in alcohol. Of this solution the patient is directed to take from 20 to 40 drops in water or milk. To children the solution can be conveniently administered in sugar water or milk.

Blickensderfer, G. M.: Vaccine Therapy in Pertussis. *Colorado Medicine,* March, 1920, xvii, No. 3, pp. 62-66.

The writer's experience with the pertussis vaccine as a prophylactic agent comprises 27 patients, all of whom were exposed by dwelling in houses where the disease prevailed. Of these, 5 were already showing symptoms of the onset, having coughs, and one having vomited. This one child developed a whoop, but the case was mild. The 4 other patients were apparently aborted. Of the remaining 22 who were inoculated, three developed the disease, but the cases were all mild and ran a short course. Nineteen did not develop a cough.

The writer believes that in pertussis vaccine we have the most valuable agent in the prophylaxis and treatment of pertussis that is known to medical science today. There is a general consensus of opinion that the prophylactic results are better than the therapeutic results. A significant point is that the more recent writers on the subject have been using larger doses of the vaccine, some giving as high as 8,000,000,000 bacteria at a dose. These are largely the observers who are reporting favorable results. The cases treated in private practice show better results than those treated in institutions.

Molyneux: Radium in the Treatment of Tuberculous Adenitis. *British Medical Journal*, Nov. 29, 1919; abstracted in *American Journal of Electrotherapetchics and Radiology*, Oct. 1920, xxxviii, No. 10, p. 365.

Molyneux states "that during 1913-14 he decided he would try to see what could be done for tuberculous glands by radium. As a result he is convinced that the day of radical operation will soon be past, that it will no longer be necessary to send children thus affected for prolonged periods to the seaside and that the unsightly scars which disfigure the necks of so many girls can now be avoided. Radium is, if properly used, as safe and, as far as he can see, a certain cure, whether for an early or an advanced case of tuberculous glands. Within the period named he has treated between 20 and 30 cases of every grade with radium. In every case the swelling and even old sinuses faded away. Unless there were already sinuses present, no scars were left. The skin was in some a little red for a few weeks from the action of the radium, but this always disappeared. In no case was any ulceration caused. It is unnecessary to describe all the initial experiments and the doses used. As a result he finds as follows: Fifteen milligramms (.231 grain) of radium bromid, spread out on a flat circular applicator 1 1/4 inches in diameter, and mixed with a special varnish to keep it even and prevent loss, is sufficient for this kind of treatment. The applicator has a screen of silver 1 mm. (.03937 inch) thick, and a piece of thin gutta-percha tissue tied over the whole to prevent soiling of the radium. The applicator is strapped on over the tuberculous glands. He has found ten hours a suitable time for each application of the above strength,—that is, 150 milligramm hours. The applicator is applied when the patient goes to bed, and taken off in the morning. A different gland or group of glands can be attached at each sitting till all have been covered, and the course then started again.

The patients usually have had two applications a week. Nothing was noticed for from a week to ten days, but from that time a gradual shrinkage of the glands was observed till nothing could be felt except a few fibrous nodules. He continues the treatment till all signs of trouble have disappeared. In very bad cases he usually gave in addition a few applications three months later, but doubts whether this is really necessary if the first treatment is properly carried out.

"Only a few physicians are fortunate enough to possess radium, while many have interrupterless transformers, and *x*-ray coils, which can be employed in destroying the tuberculous glands as readily as by the use of radium. With a measured dose of *x*-rays, and a filter of one thickness of sole leather,

used in order to prevent any injury from the secondary rays, combined with two mill-amperes of aluminum, two treatments per week can be given with practically no danger of any serious reactions, if properly used."

"Cases treated fifteen years ago by the *x*-ray method have not reappeared, while in all cases so treated there was a decided gain in weight and in general health. Any focus of infection from tonsils and adenoids, should be removed before any treatment is instituted."

"When suppuration has taken place, the pus should be evacuated through as small an opening as possible, after which the *x*-ray treatment can be given. When hypertrophied scars or keloids have formed from surgical operation on the glands, or from suppuration, the disfigurement can be removed with the ultraviolet light, using the quartz lens compressors to dehematize the tissues.

Lynah, H. L.: Bronchoscopic Treatment of Bronchiectasis and Pulmonary Abscess. *Medical Record,* 1920, xcvii, 215.

The author advocated the use of the bronchoscope in the treatment of bronchiectasis and pulmonary abscess. Many patients have not only been relieved but cured by establishing proper drainage of the lung. In some cases it is not possible to enter an abscess cavity with the bronchoscope, but nevertheless patients are much relieved by pulmonary washings, and the thick purulent expectoration is softened.

Bronchiectasis resulting from bronchial stenosis is more readily dealt with by bronchial dilatation and drainage. In one case of bronchial stenosis, the right bronchus was drained and the lung aerated by the introduction of a long soft fenestrated rubber tube into the right bronchus. The patient wore the soft rubber tracheobronchial tube for six months and made a complete recovery. She is still perfectly well, two and one half years later.

Willcox: The Atropin Treatment of Pylorospasm in Infants. *Virginia Medical Monthly,* 1920, xlvii, No. 4, p. 149.

S. V. Haas (*Archives of Pediatrics*, Oct., 1919) advocated the use of atropin in pylorospasm and pelvic stenosis. He, in his article, says that pylorospasm is due to disturbance of physiologic function of the vegetative nervous system. Under this hypothesis, hypertrophic pyloric stenosis is considered as an advanced degree of pylorospasm. "This does not gainsay the existence of pyloric stenosis so liberally reported in the literature as requiring operation for relief. Operation should be a rarity for this condition and should never be practiced until atropin has been tried. Upon the hypothesis that the vegetative nervous system is at fault, the use of atropin presents itself as a rational therapeutic agent, since it paralyzes the vagus ending.

The author has used atropin with the result of the patients having been cured. Dosage consists of from 1/50 to 1/25 of a grain per day in a 1/1000 solution; one drop is given to infants just before feeding, and is increased to 3 or 4 drops, unless there should be flushing of the face, mydriasis, dryness of the mouth, etc.

In the discussion of this paper W. P. McDowell says, that some claim that pylorospasm and organic hypertrophy occur as separate and distinct entities; others that pylorospasm is the primary element and that when hypertrophy occurs it is the result of an over-stimulated sphincter muscle; still others say that the primary and essential element is one of hypertrophy of congenital origin, with the spasm occurring as a secondary complication. This latter theory is adopted by McDowell; he also recommends Rammstedt's operation.

D. P. West thinks that the consensus of opinion is that there is no true pylorospasm without a pyliroc stenosis. West has not had good results with atropin.

L. F. Magruder points out the importance of fluoroscopic examination. This method gives us quite a definite picture in true

pyloric stenosis, the opaque meal first filling the prow-shaped pylorus but soon assuming the shape of a ball at the most dependent portion of the great curvature. Soon there is exaggerated peristalsis with small flecks of opaque meal appearing in the small intestines. In pylorospasm we do not have the increase in peristalsis, as seen in stenosis.

C. D. Kellam contradicts the statement that practically all cases of spasm of the pylorus in children are due to a tumor and should be operated. He says: "We frequently see disturbances of the vegetative nervous sytsem producing motor neuroses of the stomach and at times a typical pylorospasm. This may be due to a true vagus hypertonia, due to excessive stimulation of the vagus; or a relative vagus hypertonia, due to a depression of the sympathetic nerve-supply of the part. The vagus supplies the circular fibers of the stomach and pylorus and is responsible for the reflex spasm of same. We know that atropin paralyzes the motor endings of the vagus; therefore a pylorospasm of this source must yield to an adequate dose of atropin.

Ostheimer, M.: Artificial Infant Feeding. "Give the Baby Enough". *American Journal of Diseases of Children,* 1920, xxi, 386-387.

The author has watched the feeding of infants from 8 to 16 months passing through many stages: proteid, sugar and fat. After all, breast milk remains the one ideal infant food. The next best substitute for it is cow's milk, certified, diluted at first with three quarters barley water; then gradually increased up to one half milk. By this time more fat seems needed, and the top twenty-four ounces off of one quart of milk are used; then the top twenty ounces from one quart are employed, still diluted one half with barley water; later whole milk is again used, diluted one quarter with barley water, and so on, increased gradually, until the baby, at nearly nine months of age, or later, is digesting whole milk, undiluted. It is customary to add about 5 per cent of sugar to each mixture, that is, one ounce to each twenty ounces of mixture. By this means the idea is carried out that young babies who have not been breast fed, be given sufficient cow's milk mixtures at each feeding, from the very beginning so that each one be allowed an increase in quantity, from time to time, just as they need it. Then their mixture is increased in quality, too, from time to time, until they reach whole milk between 8 and 12 months of age. Then, as soon as each one has four or more opposing teeth, he should be allowed to begin on semisolid food.

Paillard, H.: La Proteinotherapie. *Le Progres Medical,* Feb. 7, 1920, No. 6, p. 61.

"It seems, in general, that therapeusis becomes more perfect in proportion as it provides for each sickness a specific medicine, specific serum, medicine with an elective action (quinin, salicylate of soda, digitalis, mercury, etc.). It is certain that in the measure in which serotherapy extends its sphere (cerebrospinal meningitis, bacillary dysentery), or in which the action of a chemical body shows itself more powerful in a given disease (emetin in amebic dysentery), therapeusis has made undeniable progress, and it is now possible to cure patients formerly doomed to death. One should not fail to study the researches made in this most fertile branch of sciences.

"But these considerations should not prevent centering the attention upon certain medications, which, while not possessing a specific action against a given infection or pathologic process, nevertheless combat the disease by provoking a favorable reaction in the organism. This is the aim of treatment with metallic colloids and with albuminous substances—the proteinotherapy which forms the subject of this article.

"We introduce proteins into the organism in practicing ordinary serotherapy, but it cannot be said that we expect a therapeutic result from the protein in conjunction with

the specific, antitoxic, antibacterial action of the serum. In fact, we know the disadvantages rather than the advantages of the proteins—serum accidents, anaphylactic accidents, etc. We found one therapeutic hope upon the specific antibodies contained in the serum.

"The question deserves closer study. It is possible that the same albumins, which, injected in large doses, produce anaphylactic shock, possess a therapeutic action when employed in a suitable manner. Dufour, Crow and Legras, (Dufour and Crow: Therapeutic effect of anaphylactic shock in a case of purpura hemorrhagica in an infant of 14 months, *Soc. med. des hôp. de Paris,* May 29, 1914; and Dufour, Legas and Crow: Therapeutic use of rabbit serum in anaphylaxis (passive) to augment the coagulability of the blood and arrest hemorrhages at the onset of typhoid fever, in 2 patients, *Soc. med. des hôp. de Paris,* June 19, 1914) showed that, in the presence of hemorrhages, one may try to use one of the elements of the anaphylactic syndrome hypercoagulability of the blood. Widal (Widal, Abrami and Brissaud: Pathogenesis of paroxysmal hemoglobinuria *a frigore.* The rôle of auto-anaphylaxis, *Sem. med.,* Dec. 24, 1919) and his followers considered attacks of paraxysmal hemoglobinuria *a frigore* to be a result of auto-anaphylactic accidents. They succeeded in curing the attacks of hemoglobinuria by giving the patient injections of his own serum; the repetition of these injections causes an immunity in the patient which, under the influence of cold, prevents the dissociation of the complex which constitutes "the neuroclasitic crisis" and overcomes the hemoglobinuria.

"These data are quoted, not in order to describe the methods of treatment, which are still in an experimental stage, but to show that there are biologic facts which may profitably be considered in therapeusis. (One cannot include under protein therapy auto-hemotherapy—withdrawal of blood from a vein and reinjection into the muscles, i. e., the introduction of venous blood into the lymphatic circulation—or autoserotherapy; these are complex biologic phenomena not yet explained.)

"Nevertheless, during the epidemic of grip of 1916-1919, a comparison was made of the results of inoculating patients with their own serum, with the serum of normal individuals, or with the serum—or plasm—of convalescents from grip. Our experience leads us to belive that the serum—or plasm—of convalescents is more active than other sera. In all the phenomena it was not a question of the presence of a definite chemical body, but biologic protective substances intervened, which carry us away from the general question of protein therapy.

"The two substances used for the purpose of protein therapy during recent years are peptone and milk.

"*Peptone* was proposed and used by Nolf (Nolf: Bacteriotherapy and protein therapy, *Presse med.,* 1917, p. 583; Nolf: Concerning the antithermic and anti-infectious action of intravenous injections of peptone, *Comptes rendus soc. de biol.,* 1916, p. 649-651; Nolf: Intravenous injections of peptone in the treatment of typhoid fever, and other infectious states, *Archives med. Belges* 1917, i; Nolf: The use of intravenous injections of peptone in septicemias of traumatic origin and in serious infections, *Eravaux de l'Ambulance de l'Ocean,* 1917, i, p. 197-216; Nolf: The treatment of acute arthritis by salicylate of soda in conjunction with intravenous injections of peptone, *Press med.,* 485; Nolf: Intravenous injections of peptone in infectious diseases, *Presse med.,* Feb. 26, 1919, No. 11, p. 93). It is known that the intravenous injection of that substance is apt to cause serious symptoms—peptone shock, analogous, in many ways to anaphylactic shock. But, as Nolf has shown, peptone shock is not an accident peculiar to peptone. It may occur with any substance which suddenly changes the molecular equilibrium of the blood; every foreign protein in the midst of normal fluids may cause peptone shock.

"It is not only a qualitative but also a quantitative function of the substance introduced into the blood. The injection of

a given quantity of peptone (less than that which produces the shock) may be used therapeutically. It produces a general reaction manifested by chill and then by abundant perspiration with thermic defervescence.

"The action is comparable to that of the colloidal metals, but it is well to determine in using them, whether the disturbing factors are the metallic corpuscles or the substances employed to obtain the stability of the suspension (gelatin, serum, peptone, etc.).

"Nolf used injections of peptone in typhoid fever, streptococcic septicemia, acute articular rheumatism, pulmonary tuberculosis.

"The solution used is an aqueous solution, 10-100, of pure peptone (for bacteriologic use). This solution is sterilzied in an autoclave for a quarter of an hour at 120° F. The injection is given in the morning, intravenously, in a dosage of from 5 to 10 c. c. The injection should be performed gently (5 c. c. per minute), and should be arrested for an instant if the pulse exceeds 140 per minute. If the blood-pressure of the patient is low before the injection, the injection of peptone should be preceded by adrenalin treatment (1/2 mg. adrenalin injected four times in twenty-four hours).

"The injections are given every second day and are repeated after two or three intervals.

"Intravenous injections are preferable to intramuscular ones; the latter should be reserved for hemorrhagic patients.

Nolf's results are encouraging and invite a continuation of the study. They are confirmed by Dubard (*Jour. de med. prat.*, Oct., 1919).

"Injections of *sterilizard milk* were proposed by Thiroloix (Treatment of grip, *Bull. de la Soc. med. des Hôp.*, Oct. 11, 1918, p. 898). They were employed previously by Schmidt, and afterwards by v. Pirquet, and were used in the form of transfusions in England as early as the seventh Century.

"In France, injections of milk were employed in grip, where they were given by Thiroloux with good results, described in detail in the thesis of his pupil Casson (*These.* Paris, 1919, and *Revue gen. gaz. des hôp.*, 1919, 1068-1101).

"The German authors used them in large number of affections: typhoid and paratyphoid, erpsipelas of the face, acute articular rheumatism, hemophilia, pernicious anemia, purpura hemorrhagica, blennorrhagia, ulcer of the cornea, etc.

"The milk should be sterilized, by boiling for fifteen minutes. Injections of 5 c. c. are made into the gluteal muscles every third day. Thiroloux added to the milk 10 grains of peptone for each liter of cow's milk. It is boiled for three-quarters of an hour, filtered, in order to eliminate lumps, distributed among tubes or ampules, and sterilized in the autoclave for one-half hour at 110° F. The cold sterilization (a la bougie, is preferable. Every day or every second day, an intramuscular injection of from 10 to 20 c. c. may be given.

"The injection sometimes causes a painful local reaction. Five or six hours after puncture one may observe chill, with elevation of temperature followed by defervescence.

"Without doubt, all the medications are too recent to be subject to a definite judgment. At least they justify additional research which may indicate the place which they deserve in therapeusis, and especially in the infectious diseases."

Nolf, M.: Un Essai de Thérapeutique de la Tuberculose Pulmonaire. *Académie royalede médicine de Belgique*, Procés Verbal de lo séance du 29 Mars, 1919, pp. 33-34.

The author's first experiments were conducted with intravenous injections of peptonate of copper, obtained by the dissolution of hydrate of copper precipitated (immediately before the injection) in a concentrated solution of peptone. In cases of tuberculosis with high fever, injections exercised a favorable influence, as shown by a progressive decrease in temperature and the alleviation of the symptoms accompanying fever:

anorexia, insomnia, nocturnal sweats, etc. Good results were obtained, even in very advanced cases. Local lesions were, however, not affected.

The second series of researches had to do with progressively increasing doses of tubercle vaccine, made from cultures of human homogenous bacilli, killed by phenic acid. These injections were even better assimilated by the tuberculous patients than it was expected. Doses of one hundred million germs could be administered to robust patients at one dose. Results were satisfactory in the 60 patients treated, as regards both general health, and local lesions.

The intravenous method bids fair to be accorded the same superiority over the subcutaneous and intramuscular methods in the cure of pulmonary tuberculosis as it possesses in other diseases.

Bryson, J.: Traveling Hospital. *The Modern Hospital,* Jan., 1920, xiv, No. 1, p. 43.

A traveling hospital, used in Portland, Indiana, with success for special tuberculosis cases, is described in detail. It is built to give ten years' service, and as it is on wheels it can be moved wherever needed, whereas the knock-down hut can be moved only four or five times before it becomes junk.

King, C. W.: Is Epilepsy Curable? *Ohio State Medical Journal,* Feb., 1920, pp. 95-98.

The author believes that endogenous organism due to disordered metabolism is the real cause of epilepsy. What is the cause of disordered metabolism? Answer: The long-continued use of a badly balanced diet in connection with defective elimination.

In beginning the treatment the first, though not the most important, feature to consider is the environment of the patient. He should be placed in the country where both mental and physical rest, relaxation and comfort can best be had; he should live out of doors and indulge in daily gentle exercise.

The epileptic should be given a diet with a lower percentage of proteid than is proper for the average person and much lower than is usually consumed by the average person.

The usefulness and efficiency of drugs in the treatment of epilepsy are limited to their ability to correct errors in digestion, assimilation and elimination. Their function is to establish and maintain a normal metabolism. There is one drug which is of much more value in maintaining a healthy digestive tract, including liver, stomach, intestines and intestinal flora, than all the other combined. That drug is turkey rhubarb root. It is not only the best laxative, it is a tonic and a stimulant to the entire digestive system. It is antiseptic and a strong preventive of destructive fermentation of all kinds. The author has used it in all cases of epilepsy, usually in combination with sodium bicarbonate and small doses of ipecac, and in many cases with tincture of nux vomica. The stock formula made by Squibbs and listed as Rhubarb, Ipecac and Soda Compound, No. 3, he uses more than any other. In some cases the nux vomica is not advisable; then the same formula with the exception of the nux, No. 2, is best to use.

Bromids and other motor depressants are not curative and should never be given, with the exception of a case of stubborn insomnia; then it is proper to give a proper dose of sodium bromid with chloral at bedtime, only for a few nights.

In treating anemia, so often found in epileptics, iron gives the best results. In children, Eisenzucker, five grains after meals; in adults Bland's mass, or ferri-pomatum, or tincture of the chlorid of iron.

In conclusion, the author expresses his firm belief that if a properly balanced diet were used by everybody, at all times, within the next two or three generations all such diseases and conditions such as neurasthenia, epilepsy, migraine and other neuralgias and myalgias, rheumatism, gout, chronic nephritis, and diabetes mellitus, would be

eliminated and the average length of human life astonishingly increased.

Eggleston, C. (New York): Administration of Digitalis by "Eggleston Method". *Journal of the American Medical Association,* March 13, 1920, lxxiv, No. 11, pp. 733-734.

The author has written this article in reply to many requests for details for further information as to the practical application of the method involved in the administration of digitalis, which were not fully taken up in his original article. (Eggleston, C.: Digitalis Dosage. *Arch. Int. Med.,* July, 1915, xvi.)

This method of digitalis dosage and administration is designed especially for rapid digitalization by oral administration. It depends upon the establishment of an average total amount of digitalis which is required to produce full digitalization, or the minor toxic actions of digitalis. This total amount is expressed in terms of the activity of the drug and the patient's body weight in pounds. The activity of the drug is determined by the cat method of Hatcher (Hatcher, R. A., and Brody, J. G.: The Biological Standardization of Drugs. *Amer. Jour. Pharm.,* 1910, lxxxii, p. 360), the unit being the weight of dry drug, in milligrams which is required to kill 1 kg. of cat when a solution is injected slowly and continuously intravenously. This amount is called a cat unit. High grade specimens of digitalis, when not assayed by the cat method, may be regarded as having an average activity of 100 mg. to the cat unit. The average total amount of digitalis required for oral administration to man is 0.15 of one cat unit per pound of body weight.

Calculation of Average Total Amount.—The calculation of the average total amount required by any given patient may be as follows:

(1) The patient's weight is determined in pounds.

(2) The cat unit of the digitalis is determined.

(3) One of the following formulas is applied:

Formula I: $\frac{\text{C.U.} \times 0.15 \times \text{W}}{1{,}000}$ = Grams of powdered leaf in total amount.

Formula II: $\frac{\text{C.U.} \times 0.15 \times \text{W}}{100}$ = Cubic centimeters of tincture in total amount.

Formula III: $\frac{\text{C.U.} \times \text{W}}{100}$ = Cubic centimeters of infusion in total amount.

In these formulas, C. U. is the number of milligrams in one cat unit, and W is the patient's body weight in pounds. The following example illustrates the use of these formulas: A patient weighs 150 pounds, and the digitalis available has an activity of 100 mg. to the cat unit. Applying Formula 1 for the powdered leaf, we have 100 x 0.15 = 15; 15 x 150 = 2,250; 2,250 ÷ 100 = 22.5 = grams of leaf in total amount. Applying Formula II for the tincture, we have 100 x 0.15 = 15; 15 x 150 = 2,250; 2,250 ÷ 100 = 22.5 = cubic centimeters of tincture in the total amount. Formula III gives 100 ÷ 100 = 1; 1 x 150 = 150 = cubic centimeters of the infusion in the total amount.

Administration of Average Calculated Total Amount.—(1) When the patient has received no digitalis within the preceding ten days, the following course is pursued:

A. *In Urgent Cases.*—From one-third to one-half of the total calculated amount is administered at the first dose. After an interval of six hours, from one-fifth to one-fourth of the total is administered. After a second six hours, from one-eighth to one-sixth of the total is given. Thereafter, if more digitalis is needed, amout one-tenth of the total may be repeated every six hours until maximal digitalization is secured. In the case of the example given above with the total amount being 22.5 c. c. of tincture, the first dose would be from 7 to 11 c. c.; the second from 4 to 5 c. c.; the third from 2.5 to 3.5 c. c., and thereafter from 2 c. c. every six hours if required.

B. *Rapid, for Non-urgent Cases.*—About one-fourth of the calculated total is to be

given at each of the first two doses, six hours apart. Thereafter about one-tenth to one-eighth of the total is given every six hours.

When the patient has been taking digitalis within the preceding ten days, the following course is pursued: Before further digitalis is prescribed, the patient is to be subjected to the most careful examination, including the use of polygraphic or electrocardiographic records if available, to determine whether or not there are any evidences of digitalis action.

C. *When Evidences of Digitalis Action Are Absent.*—The procedure is the same as outlined above, except that the total amount of digitalis required is to be reduced to 25 per cent of the total calculated. Thus, in the example used the total would be reduced to 17 c. c. instead of the calculated 22.5 c. c. and the fractions prescribed at each dose would be based on the former figure (17 c. c.). The usual one-tenth of the total every six hours may be prescribed if necessary.

D. *When Evidences of Partial Digitalization Are Present.*—It is best not to attempt to administer more than one-half of the total calculated amount of digitalis, divided equally between the first three doses. In urgent cases in this group, however, one may administer 75 per cent of the calculated amount, preferably in three equal doses, and then if digitalization is not quite complete, one-tenth of the total amount may be prescribed every six hours.

Safeguards.—If there is an appearance of one or more of the following criteria of adequate digitalization, or if minor digitalis intoxication indicates the cessation of further administration, either permanently or temporarily, the following is to be noted:

(1) Nausea or vomiting (except when due to splanchnic congestion and present before treatment is begun).

(2) Fall of heart rate (not pulse rate) to or below 60 a minute.

(3) Appearance of frequent premature contractions; of definite heart-block; of marked phasic arhythmia, or of coupled rhythm.

The observance of a six-hour interval between doses allows time for complete absorption of the preceding dose and the development of its full action on the heart so that if the patient is examined just before the administration of each dose, dangerous intoxication can be absolutely prevented. Eggleston says it is perfectly safe to give the first three doses without personally examining the patient before the second and third doses if the one nursing the patient is properly instructed to look for nausea, vomiting, or slowing of the pulse to 60 or less a minute before giving the succeeding dose, and to stop administration if any of these phenomena appear.

When a leaf, tincture, or infusion the cat unit of which is unknown, is employed, 100 mg. may be taken as the cat unit; not more than 75 per cent of the calculated total amount should be given in the first 3 doses.

When the patient cannot be weighed, or when marked edema or general anasarca is present, the body weight (exclusive of edema fluid) must be estimated as closely as posible and the total amount of digitalis calculated as usual. Not more than 75 per cent of the calculated amount should then be given in the first three doses.

Comment.—The employment of this method is without danger if the directions are followed in detail and if the safeguards are carefully observed. By its employment it is usually possible to produce maximal digitalis action in from twelve to eighteen hours, and marked therapeutic effects frequently appear within six hours after the initial dose. By its use it is possible to dispense with the intravenous or intramuscular administration of ouabain, amorphous strophanthin, or other digitalis body in great majority of cases of heart failure.

Buck, K. M.: Whooping Cough, Its Complications and Treatment. *Memphis Medical Monthly,* 1920, xli, No. 2, p. 603.

The most fatal complication is bronchopneumonia, which occurs most frequently in

patients under two years of age. Mortality from whooping-cough pneumonia is especially high in the negro race, where a great many of the children are rachitic.

The bad state of nourishment and nervous system after pertussis is liable to foster tuberculosis, after tuberculosis adenitis develops. The bronchial glands are those most frequently affected. Sometimes emphysema is present. Pleurisy and pleuritic pneumonia with pericarditis are not infrequently observed. The heart in a number of cases shows arhythmia. Acute dilitation of the right side of the heart is sometimes due to the exessive coughing, although this condition may occur as a result of bronchopneumonia. Convulsions are not uncommon, and sometimes end fatally.

Hemorrhages under the skin, into the internal ear, causing deafness, and hemorrhages into the sclerotic coat of the eye, sometimes blindness from which patients only partly recover, probably after neuritis, occur.

Malnutrition following pertussis brings on influenza, measles, pneumonia. Fresh air, proper food, good nursing are of vital importance.

The author has had good results from pertussis combined vaccine. The earlier it is administered, the better the results. In 40 cases the author with this treatment had no complicaions, and patients seemed to be in a good physical condition. He also uses a prophylactic. "I usually give one-half c. c. of the combined vaccine the first dose and then give 1 c. c. every other day for 4 doses.

Robinson, G. W.: Neuritis, Its Pathology, Symptomatology and Treatment. *Journal of Missouri State Medical Association*, May, 1920, xvii, No. 5. pp. 183-190.

The treatment of neuritis may be divided into several phases, such as preventive, medical; operative, electrical and mechanical. It is the author's opinion that drinking of an abundance of water will aid materially by preventing the accumulation of toxic and septic materials within the system, and thus prevent in many cases the development of neuritis. Excessive fatigue, muscular strain, exposure and pressure on the nerve trunk should as far as possible be avoided. Alkalis, such as bicarbonate of soda in large doses with an abundance of water, are usually beneficial in all forms of neuritis. Atophan and pyramidon are helpful in controlling the pain. Many forms of brachial neuritis are relieved by the daily injection in the supracapsular region of a 3 grain ampule of sodium cacodylate. If there are tender spots over the scapula from which the pain radiates down the arm on pressure, the injection of a few drops of a 1 per cent solution of novocain followed by a few drops of 80 per cent alcohol down the bone at the point of greatest tenderness will, in some cases, promptly and effectively relieve the pain.

During the acute stage the patient or the affected portion of the body should be kept at rest.

In brachial neuritis it is best that the arm be kept in a sling.

Rest, posture and reeducation are the important methods of treating muscles which have been paralyzed by neuritis.

Musser, J. H.: Treatment of Arterial Hypertension. *New York Medical Journal*, Oct., 16, 1920, cxii, No. 16, p. 570.

"Hypertension for which there is no obvious cause is a symptom, not a disease. It has come to be regarded as a definite entity, no matter whether the increased blood-pressure is the result of a nephropathy, an endocrine dystrophy, or a narrowing of the smaller elements of the blood vascular tree." Clinical methods are insufficient to explain, in many cases, the pathogenesis of the condition of high pressure. We usually assume that there is present a glomerular nephritis, or renal sclerosis. This uncertainty to prove these as causes of high pressure has led to a variety of names for the syndrome. Jane-

way calls it "cardiovascular hypertensive disease", and Albutt; "hyperpiesis", where elevation of blood-pressure is rather sudden. The name most frequently applied is "essential hypertension". We understand a condition of continuous high blood-pressure, systolic pressure over 175 mm. Hg., of unexplained cause. Patients may or may not have symptoms relating to high pressure.

General Treatment.—Active measures are to be avoided unless absolutely necessary, as hypertension is a compensatory process. Only in case of threatening apoplexy, etc., sudden reduction is justifiable. It is hard to reduce pressure suddenly, and cardiac failing or uremia would ensue.

Diet.—Avoid overeating; it is probably the most frequent cause of high pressure. Eat regularly, slowly, rest 15 or 20 minutes, as pressure rises immediately after eating. Avoid alcohol; use tobacco sparingly. Eliminate large quantities of protein food, also fish, white meats, eggs. Eat one small slice of meat a day. Take milk moderately in chronic cases. Yet using milk "as a food alone, 1000 c. c. (33.81 fluidounces) a day for several days, will reduce a pressure which has been found absolutely resistant."

Physical Effort.—No sudden excessive or any excessive effort should be permitted, but, a certain amount is advisable. Avoid hurry, worry, and mental strain. Much rest is recumbent position should be taken and mild sedatives should be given in case of insomnia.

Elimination.—From 1 to 2 good loose bowel movements should be induced, if necessary, with morning saline; otherwise with calomel, 1 to 2 a week, etc.

Hydropathy.—Electric cabinet baths—1 to 2 a week, or Turkish baths—1 to 2 a week, with mild exercise should be taken; or a bath for 15 minutes in water at 103° F. (39.44° C.) may be substituted.

Drugs.—These are of little value over any length of time. Iodids may be used in syphilitic cases only. Nitrites produce temporary fall in pressure only—quick tolerance in prolonged use. Benzyl benzoate is not very valuable in hypertension.

Reduction of Salt and Water Intake

7 Cases	Before Treatment		After Treatment	
	Systolic	*Diastolic*	*Systolic*	*Diastolic*
1	185	85	125	75
2	215	105	170	85
3	157	79	130	80
4	204	115	170	105
5	205	120	160	100
6	174	80	145	75
7	230	110	210	100

A fifty-three year old widow with gastric symptoms, ringing in ears, nycturia, intermittent heart was treated with potassium iodid and sajadin; subsequently she was placed upon a modified restricted salt free diet and prolonged warm baths. The preliminary blood-pressure was 205-126; one week after treatment 185-105; later reduced to 160-100. The plasma chlorid estimation is of great value. Reductions of pressure and of chlorids run parallel, so that plasma chlorid reduction may be judged by pressure reduction, if laboratory facilities are lacking.

Allan, R. M.: The Conservative Treatment of Eclampsia. *Medical Journal of Australia,* Sydney, May 1, 1920, i, No. 18, pp. 405-407.

In Allan's series of eclamptics there were 94 cases: 64 in primparæ and 30 in multiparæ. The majority were between 20 and 25 years of age. Twins figured in 8 cases. There were no cases of hydramnios.

Fits occurred as follows: Antepartum 34, intrapartum 11, postpartum 28, mixed 21. Six patients who had fits during the antepartum period, died, and two who had fits during the postpartum period also died. The relative frequency of the postpartum group occurred in 30 per cent of the cases with a mortality of 7 per cent.

Prognosis is uncertain. Death may occur after few fits or recovery after many. The following symptoms are bad signs: A temperature above 39.4° C. (103° F.); a subnormal temperature; a weak, thready, rapid pulse, especially if associated with high tem-

perature, edema of the lungs, particularly if pale cyanosis be present between the fits; anuria or hemoglobinuria; jaundice. Antecedent renal disease makes the prognosis in multiparæ much worse.

The majority of *deaths* were due to exhaustion, edema of the lungs and heart-failure. The figures regarding maternity bear out the statement of Edgar that from 8 to 10 per cent die no matter what treatment is adopted, while the rest recover by conservative measures. Eighty-six mothers recovered and 8 died—a mortality of 8.5 per cent. Of these 2 were primiparæ. Many of the latter had old renal disease.

Fetal mortality must always remain high, owing to the prematurity of so many of the infants. Prematurity and toxemia will react against any measure of treatment, active or conservative. In Allan's series 102 children were born,—60 alive and 42 dead. Of the latter 19 were premature or lacerated, leaving 23 full-term still-born children. The total mortality was 41 per cent, but if those who would not have lived in any case, be deducted, it is only 22 per cent.

The causes of death, apart from those already mentioned, are asphyxiation from fits or drugs given to the mother and birth injuries due to accouchement force.

Principles of Treatment.—Allan summarizes the principles of his method as follows:

(1) *Delivery as soon as Possible.*—Prolonged labor is bad for the mother. The child need not be considered, as in so many cases it is premature. Labor is never induced, but if it has commenced, the patient is not allowed to go on indefinitely. As soon as the os is fully dilated, forceps are applied or the breech extracted. Vaginal examinations are strictly limited owing to the special risk of sepsis associated with this condition. Pituitary extract is never employed because of its effect on the blood-pressure.

(2) *Restrictions of Further Metabolism.*—(*a*) By Starvation.—This is very important, for intestinal irritation is closely connected with the onset of convulsions.

(*b*) By Morphin.—This controls the fits and decreases metabolism and cerebral irritation.

(*c*) By Gastric Lavage.—This is of great importance for the removal of fermenting food.

(3) *Eliminatory Treatment.*—(*a*) Rectal Lavage.—The thorough and rapid evacuation of the bowels is probably the most important part of the treatment.

(*b*) Sweating.—This is done with a pack. Pilocarpin was not employed because of the risk of edema of the lungs.

(*c*) Urinary Secretion.—Copious draughts of water are given as well as poultices to the loins, renewed at frequent intervals. Hypodermic injections of digitalin were also used.

(*d*) Venesection.—This was not extensively performed. While a certain amount of toxin is removed, it causes cardiac depression and concentrates the remainder of the toxin. There is a sudden fall of blood-pressure accompanied by shock and anemia, which is not only cerebral but general.

(4) *Treatment of Special Symptoms.*—(*a*) Fits.—Morphin is the best drug. Chloral is not used as it is a cardiac depressant. A general anesthetic is administered only while the stomach and rectum are being washed out, to obviate any stimulation of the patient during these manipulations. Allan still uses chloroform, though recognizing that for continuous use it is not suitable, because it predisposes or causes hepatic necrosis.

(*b*) Cardiac weakness is treated with digitalin and alcohol.

(*c*) *Respiratory Symptoms.*—To prevent the slowing of the respiration due to morphin, atropin may be given occasionally in conjunction with the former drug. Oxygen should be always at hand.

Treatment of Individual Case.—This entails rigid adherence to many points of detail. The case should not be handed over entirely to the responsibility of the nurse. The patient should be placed in a dark room, away from all noises. She must be kept on her side. No fluids must be given by mouth

to an unconscious patient. Morphin (0.03 gram [1/2 grain]) is given hypodermically and repeated in 15 milligram doses every two hours if the fits are continuous. This maximum must not be exceeded. Atropin (0.0006 gram [1/100 grain]) may be added to the morphin. A purgative and water in abundance is given. Digitalin is given in 0.0006 to 0.0012 gram (1/100 to 1/50 grain) doses if the heart be failing. Careful watch must be made to detect any signs of the onset of labor. A gag must be kept ready for instant use whenever a fit occurs. On the least sign of respiratory difficulty the patient should be turned on her chest, and her head hung well over the edge of the bed. If the pulse or respirations cease, oxygen should be administered and artificial respiration carried on without any delay.

During convalescence it is of the utmost importance that the patient be kept on a very low diet. Water only is allowed for at least three days. Then albumen-water is added followed by whey and finally dilute milk and water.

GALLAVARDIN, M. L.: Fundamental Indications for Digitalis Medication (Les Indications fodnamentales de la medication Digitalique). *Lyon Medicale,* Aug. 10, 1920, cxxix, No. 15, p. 649.

Digitalis has no effect on the lesions of the heart. Its action on the kidneys and vessels is problematic or accessory; its sole effect is amelioration of the heart's physiology.

General Indications.—The heart consists of a commanding system, and a contractile mass.

Digitalis a Rythmical Remedy.—The most beneficial effect of digitalis is the diminishing of acceleration of the pulse. The acceleration is caused by change in the rhythm of the heart.

Effect on the Sinus-rhythm.—Digitalis has very little effect on the normal heart. It takes a toxic dose to reduce the pulse even a few beats. Palpitation of the heart, which is excited at the junction of vena cava superior and right auricle, is affected only to a slight degree, and in febrile palpitation it fails. The author saw, for instance, 4 mg. (.0616 grain) given to a fifteen-year old patient with typhoid in 4 days. It agreed with the patient, but the frequency of pulse was not diminished.

In nervous palpitation, Basedow, etc., it likewise fails, or even makes palpitation worse. In palpitation in patients with valvular or hypertrophic trouble it acts irregularly and but slightly. With these, especially in mitral, or mitro-aortic trouble or hypertrophy the pulse is often diminished considerably, but even in serious cases of myocarditis, aortic or endocardiac insufficiency the pulse will remain unchanged at 120 or 130. Evidently the diminution is due to the action of digitalis on the pneumogastric in certain sinusal palpitations. It does not or only in a slight degree ensue after cutting the vagus and ceases instantly, in man, on giving an injection of atropin.

Auriculorventricular Incompetency.—The action of digitalis seems to halt at the His band. Probably the effect of the drug in this region is due to the vagus. Even where there is no incompetency digitalis will lengthen the intervals, and cause intermissions. In latent cases of incompetency digitalis may reveal the disease in causing ventricular intermittance. In heart-block (Adams Stokes') and its modified forms, digitalis aggravates, intermittancy becomes more frequent, the pulse drops, etc. In established cases of heart-block with pulse at 30 or 35, digitalis may act on the valves, but has no effect on the ventricles.

It is necessary to be very careful in the use of digitalis, especially in incompetency, and also in partial heart-block, and to give only very mild doses. Many sudden deaths after administration of digitalis or digitalin may have resulted from latent incompetencies.

These are the rare cases; the more frequent are the arhythmic. Complete arhythmia and auricular fibrillation—delirium cordis, pulsus irregularis perpetuus—80-100

on an average, 160-180 in some patients, is benefitted by digitalis, as it markedly reduces the action at His band. It acts better on an irregular than on a regular pulse. Digitalis affects the sinus badly, but benefits the auriculoventricular passage. The tachyarhythmia in certain aged patients in infectious diseases, etc., will be benefitted.

Abnormal tachycardia, especially auricular flutter, setting in suddenly in heart-disease or where there is no organic trouble, the ventricle not being able to follow the rapid rhythms, does not follow but every second contraction of the auricle; here it is that digitalis acts on the His band.

Extrasystolic Arhythmia.—In light cases digitalis may prove beneficial, but not in all; in cases, where there is some organic trouble, digitalis may calm the irregularity. Digitalis may also act directly on the myocardium. It is proved by the fact that certain functional improvements are out of proportion with the slight change in rhythm and by the beneficial action of digitalis on the alternating heart.

Practical Indications.—So digitalis reduces the rhythm and acts as a tonic on the myocardium. In all cases of heart trouble digitalis may some time or other be indicated. It is not necessary to overestimate the renal lesions, albuminuria, or hypertension. The action of digitalis does not consist so much in elevation or depression of pulse as in the restoration of the initial rhythm of the tension. Tension is more frequently reduced than augmented by digitalis. It is not right to frighten physicians into the dread of bursting blood-vessels in hypertension. In valvular trouble and hypertension, hypertrophy of the right ventricle after chronic pulmonary affections, digitalis is indicated, although its effect is more clearly evident in Bright's heart, so-called chronic myocarditis, where the symptoms are progressive, in heart-failure with arhythmia and moderate general arterial hypertension, furthermore, auricular tachysystolic affections and rhythmic disorders. Wherever the drug seems indicated the physicians may try it carefully and in little doses.

Where Digitalis Fails.—In mitral insufficiency with regular rhythm, often in women in their prime with symptoms of mitral stenosis—for instance, of rheumatoid origin—with a sinus rhythm which is hardly accelerated, 90-90. They consult the physician for short breath, and he finds a tendency to pulmonary edema. They sometimes cough on slight efforts. In these cases digitalis often fails. Sometimes it fails in mitral stenosis with complete arhythmia at an average pulse of 60-70; here the slowing of the pulse by digitalis is not of place. It is the same with aortic insufficiency, with regular rapid pulse at 120, not only in aortic arterial insufficiency, but also in those purely endocardiac. Dyspnea and acceleration of pulse will continue after administration of digitalis. It fails in the syndrome of left-sided ventricular insufficiency in lesions of the myocardium, dyspnea, pulmonary edema at night. It will sometimes seem as though digitalis would help, but it soon proves ineffective. Most patients, with whom digitalis is ineffective, dislike the drug. They dread nervous, muscular effects.

Administration.—Never give digitalis where there are no functional disturbances. Give the remedy from the onset of cardiac insufficiency, varying the doses. Anticipate hyposystolic or asystolic conditions rather than treat them after they are established. Do not give excessive doses of digitalis, or especially digitalin; 1 mg. (.0154 grain) at a time of digitalin may kill. Given in one day it may still prove fatal, and is unnecessary. A veritable crusade has been established in France and elsewhere for small doses, to be long continued. A solution of crystalline digitalin, for instance, will be given in doses of from 5 to 15 drops per day, in 2 or 3 doses, during several days, rarely giving more than 1 mg. (.0154 grain).

Paillard, H.: Protein Therapy. *Le Progres Medical*, Feb. 7, 1920, No. 6, p. 61.

It seems, in general, that therapeusis becomes more perfect in proportion as it pro-

vides for each sickness a specific medicine, specific serum, medicine with an elective action (quinin, salicylate of soda, digitalis, mercury, etc.). It is certain that in the measure in which serotherapy extends its sphere (cerebrospinal meningitis, bacillary dysentry) or in which the action of a chemical body shows itself more powerful in a given disease (emetin in amebic dysentery), therapeusis has made undeniable progress, and it is now possible to cure patients formerly doomed to death. One should not fail to study the researches made along this most fertile branch of science.

But these considerations should not prevent the physician from fixing his attention upon certain medications, which, while not possessing a specific action against given infection or pathologic process, nevertheless combat the disease by provoking a favorable reaction in the organism. This is the aim of treatment with metallic colloids and with albuminous substances, the protein therapy which forms the subject of this article.

We introduce protein into the organism in practicing ordinary serotherapy, but it cannot be said that we expect a therapeutic result from the protein in conjunction with the specific, antitoxic, antibacterial action of the serum. In fact, we know the disadvantages rather than the advantages of the proteins—serum accidents, anaphylactic accidents. We found one therapeutic hope upon the specific antibodies contained in the serum.

The question deserves closer study. It is possible that the same albumins, which, injected in larger doses, produces anaphylactic check, possess a therapeutic action when employed in a suitable manner. Dufour, Crow and Legras (Dufour and Crow: Therapeutic Effect of Anaphylactic Shock in a Case of Purpura Hemorrhagica in a Child of 14 Years. *Soc Méd. Des. hôp. de Paris.*, May 29, 1914; and Dufour, Legras and Crow: Therapeutic Use of Rabbit Serum in Anaphylaxis (passive) to Augment the Coagulability of the Blood and Arrest Hemorrhages at the Onset of Typhoid Fever, in 2 Patients. *Soc. Med. des hôp. de Paris*, June 19, 1914) showed that, in the presence of hemorrhages, one may try to use one of the elements of the anaphylactic syndrome,—hypercoagulability of the blood. Widal (Widal, Abanii and Brissaud: Pathogenesis of Paroxysmal Hemoglobinuria *a frigore*. The Rôle of Autoanaphylaxis. *Sem. méd.*, Dec. 24, 1913) and his followers considered attacks of paraxysmal hemoglobinuria *a frigore* to be a result of autoanaphylactic accidents. They succeeded in curing the attacks of hemoglobinuria by giving the patient injections of his own serum; the repetition of these injections causes an immunity in the patient which, under the influence of cold, prevents the dissociation of the complex which constitutes "the hemoplastic crises" and overcomes the hemoglobinuria.

These data are quoted, not in order to describe the methods of treatment, which are still in an experimental stage, but to show that there are bilogic facts which may profitably be considered in therapeusis.

The two substances used for the purpose of protein therapy during recent years are peptone and milk.

Peptone was proposed and used by Nolf (Nolf: Bacteria Therapy and Protein Therapy. *Presse méd.*, 1917, p. 583). It is known that the intravenous injection of that substancce is apt to cause serious symptoms—peptone shock, analogous, in many ways, to anaphylactic shock. But, as Nolf has shown, peptone shock is not an accident peculiar to peptone. It may occur with any substance which suddenly changes the molecular equilibrium of the blood; every foreign protein in the midst of normal fluids may cause peptone shock.

It is not only a qualitative but also a substance introduced into the blood. The infection of a given quantity of peptone (less than that which produces the shock) may be used therapeutically. It produces a general reaction manifested by shivering and then by abundant perspiration with thermic defervescence.

This action is comparable to that of the colloided metals, but it is well to determine in using them, whether the distinctive fac-

tors are the metallic corpuscles or the substances employed to obtain the stability of the suspension (gelatin, serum, peptone, etc.).

Nolf used injections of peptone in typhoid fever, streptococcic septicemias, acute articular rheumatism, pulmonary tuberculosis.

The solution used is an aqueous solution, 10 to 100, of pure peptone (for bacteriologic use). This solution is sterilized in an autoclave for a quarter of an hour at 120° F. (48.89° C.). The injection is given in the morning, intravenously in a dosage of from 5 to 10 c. c. The injection should be performed gently (5 c.c . per minute) and should be arrested for an instant if the pulse exceeds 140 per minute. If the blood-pressure of the patient is low before the injection, the injection of peptone should be preceded by adrenalin treatment (½ mg. adrenalin injected four times in twenty-four hours). The injections are given every second day and repeated after two or three intervals. Intravenous injections are preferable to intramuscular ones; the latter should be resumed for hemorrhagic patients. Nolf's results are encouraging and invite a combination of the study. They are confirmed by Dubard (*Jour. de. méd. pract.,* Oct., 1919).

Injections of sterilized milk were proposed by Hiraloix (Treatment of Grip. *Bull. et mém. Soc. méd. des Hôp. de Par.,* Oct. 11, 1918, p. 898). They were employed previously by Schmidt and afterwards by v. Pirquet, and were used in the form of transfusions in England as early as the 17th century.

In France, injections of milk were employed in grip, where they were given by Hiroloix with good results, described in detail in the thesis of the pupil Cassær (*These,* Paris, 1919; and Gaz. des Hôp., Par. 1919, p. 1069, and 1101).

The German authors used them in a large number of affections, typhoid and paratyphoid, erysipelas of the face, acute articular rheumatism, hemophilia, pernicious anemia, purpura hemorrhagica, blennorrhagia, ulcer of the cornea, etc.

The milk should be sterilized, by boiling for (15 minutes). Injections of 5 c. c. are made into the gluteal muscles, every third day. Miroloix added to the milk 10 grains of peptone for each liter of cow's milk. It is boiled for three-forths of an hour, filtered, in order to eliminate lumps, distributed among tubes, or ampules, and sterilized in the autoclave for one half hour at 110° F. (43.33° C.). The cold sterilization (a la Bougie) is preferable. Every day, or every second day, an intramuscular injection of from 10 to 20 c. c. may be given.

The injection sometimes causes a painful local reaction. Five or six hours after puncture one may observe shivering, with elevation of temperature followed by defervescence.

Without doubt, all the medications are too recent to be subject to a definite judgment. At least they justify additional research which may indicate the place which they deserve in therapeusis, and especially in the infectious diseases. One cannot include under protein therapy autohemotherapy—withdrawal of blood from a vein and reinjection into the muscles, i. e., the introduction of venous blood into the lymphatic circulation or autoserotherapy; these are complex biologic phenomena not yet explained.

Nevertheless, during the epidemic of grip of 1918-19, a comparison was made of the results of inoculating patients with their own serum, with the serum of normal individuals, or with the serum—or plasm—of convalescents from grip. An experience leads us to believe that the serum—or plasm—of convalescents is more active than other sera.

In all the phenomena it was not a question of the presence of a definite chemical body, but biologic protective substances intervened, which carry us away from the general question of protein therapy.

WAR MEDICINE AND RECONSTRUCTION

NINTH SESSION OF THE RESEARCH SOCIETY OF THE AMERICAN RED CROSS IN FRANCE: Conference on Tuberculosis of the Lungs. *War Medicine,* Jan., 1919, ii, No. 6, pp. 971-999.

Section 10, pp. 993-995: *What can we learn regarding pulmonary tuberculosis from the opportunity afforded by the general postmortem?*

According to the investigations of *Major H. W. Cattell,* "tuberculosis is the direct cause of death in a little over 2 per cent of those soldiers who come to autopsy."

Major D. J. Glomsett comments upon the rarity of deaths from tuberculosis in the army. Of 308 autopsies, only 6 showed tuberculosis as the cause of death. This is perhaps due to the fact tht young men are less liable to tuberculous lesions than are older men. Such evidence, the author says, "hardly supports the view that all infection is in childhood, and I find it may be as easy to become infected with tubercule in later life as with other diseases."

The majority of the author's cases have shown a primary focus in the lung, with a secondary focus in the hilus. Tuberculosis seems to travel from the lung to the mediastinum. The lesions are usually found in the upper and lower lobes, especially on the left side. Autopsies on American soldiers have shown deposits of tubercle bacilli in less than 25 per cent of the cases.

Major H. E. Robertson was struck with the high percentage of tuberculous lesions in German soldiers. Of 100 autopsies 70 per cent revealed deposits in the lungs or nodes, especially in the nodes at the bifurcation of the trachea.

Captain H. N. Desjardins gives a table for the results in 20 cases of tuberculosis out of a series of 82 deaths from all causes. The leions were usually in the lower lobe of left lung:

	Acute	Fibrous	Chronic Calcareous	Miliary
Lungs	0	1	11	0
Trach.-Bronch. Lymph-nodes	0	0	7	0
Liver	0	0	0	4
Spleen	0	0	0	2
Mesenteric lymph-nodes	0	0	1	0

Captain E. C. Ernst, by means of *x*-ray photographs of the thoracic contents in the case of British soldiers, found that 70 per cent revealed calcified tubercle deposits in the nodes of the mesentery. In about 15 per cent deposits were found later on dissection of the lungs, mesenteries and tracheobronchial lymph-nodes. Autopsies on American soldiers have shown such deposits in the mesentery in only 35 per cent of cases, and only 15 per cent have shown deposits in the lungs and not in the mesentery.

Colonel Sir A. Wright finds that the tubercle bacillus will seldom grow in the blood, except in acute cases, where the resistance in the blood is overcome. The bacillus grows in the upper lobes and in the connective tissue. The author advocates mixed inoculations—vaccines of microbes other than the tubercle bacillus—when tuberculin is ineffective. "With any microbe inoculated you have protection against the whole lot; if I inoculate a man against typhoid I immunize him against streptococcus and staphylococcus."

GAILLARD, J.: Radioscopic Examination of the Heart and Aorta in the War Tachycardias. *Archives des maladie du coeur,* 1920, xiii, 40.

Orthodiagraphic examination of 34 patients with irritable heart showed 15 cases with normal hearts and aortas. In 2 cases the heart was normal but there was an expansion of the transverse arch of the aorta. In 14 cases there was more or less marked hypertrophy of the left ventricle and one of these also showed a wide transverse arch. Four cases showed a distinct expansion of the orta.

THOMAS, E.: The Affections of the Circulatory System with the Soldiers of the Belligerent Armies (Les affections du systeme circulatiore chez les soldats des armees belligerantes). *Revue medicale de la Suisse Romande*, July 1920, xl, No. 7, p. 422.

Hume's statistics on 500 soldiers gives among 8 per cent disease of other parts, 5.6 per cent cardiac lesions, and of those 86.2 per cent (862 cases) as functional disease. Aortic insufficiency was noted in 11 cases; mitral insufficiency in 19; mitral retraction in 17; mitral retraction and aortic insufficiency in 5; paroxysmal tachycardia in 3.

Functional disease occurrred between 20 and 30 years. In professional people doing light work, 256 cases or 25.6 per cent; among those working in open air, 20 per cent; with sedentary occupation 17, or 8 per cent; hard industrial work, 75, or 2 per cent; light industrial, 12 or 5 per cent; army and marine, 5 or 5 per cent; others, 2 per cent. Gouget writing on military aptitude found 340 cases, among them, 130 organic, and 120 cases functional; mitral insufficiency, 43 cases; mitral retraction, 28; retraction and insufficiency, 5; aortic insufficiency, 15; systolic bellow's sound of aorta, 4; double aortic blowing, 5; mitro-aortic, 3; infectious endocarditis, 1; pericarditis sicca, 1; angina pectoris, 2; asystolic, 3; hyposystolic, 7 cases.

Among Wenckebach's 400 cases, 8.2 per cent were of organic lesions; 360 cases without lesion; 11 per cent with corpendulum; 5½ per cent of varied arhythmic troubles; 50 per cent, tachycardia; and 47 per cent, systolic bellows.

Aubertin gives 100 cases, of which 51 have organic affections, 49 functional syllaba in 500 soldiers with healthy heart, 53.4 per cent with normal sounds, 46.6 per cent with an organic accidental blowing sound.

Nobecourt and Peyre find 17 cases of organic affections in 770 with various diseases, that is, 2.2 per cent. In subsequent publications they find among 949 soldiers, examined during 11 months, 17 cases of acute endo- and pericarditis, 27 with chronic valvular lesions.

D'Oelnitz, who treated during 18 months a battalion of territorials who were in the front line, and more than 35 years old, found 7 per cent with established heart disease or tachycardiac trouble.

Lian among 200 cases finds only 8 of valvular affection.

Schlessinger at the Base Hospital on the Russian Front, had among 171 patients, 26 cases of valvular affection, frequently with rheumatic history; 40 with a soldier's heart, at 17 to 51 years, many having suffered before the war.

Adolf, doctor in a Replacement Battalion found in men of from 20 to 30 years of age, not having been at the front, and among 53 cases of heart trouble 5 of cardiac insufficiency and 24 of nervous heart.

The author writing about the Swiss army found heart disease in a percentage of all disease as follows:

	1914	1915	1916	1917
1st Division	3.6	2.6	2.7	2.6
2nd Division	3.6	2.8	2.0	2.0
3rd Division	2.6	2.4	3.2	5.0
4th Division	3.2	2.3	2.4	2.4
5th Division	2.8	2.4	2.8	2.4
6th Division	3.1	2.6	1.7	2.0

Lyon tested hearts by gymnastics, genuflexions, etc., and in another test, lifting of weights. Martinet used dynamic tests. Determann let patients walk up and down stairs. Lidy has a test of 20 to 30 minutes, combined gymnastics, recumbent and upright position, alternating genuflexions. He comes to the conclusion that persistent lack of rhythm after repeated tests is a sign that soldiers are unfit for service. Rehfisch tests by body-flexion. Korach examined soldiers after they had had infections diseases—typhoid, etc.—and finds great variability of the maximum pressure, and fixity of the minimum pressure in nervous cases, whereas the minimum pressure is variable in heart lesions.

Minkowski, Matz, Merklen and Desclaux, and Vaquez et Denizolot have employed similar tests. Meyer has made 15,000 radioscopies or radiograms. He observed, for instance, the abnormal heart beat near the His band in cases of mitral lesions at the initial

stage, etc. Loeper, Dubois and Wagner have studied the effect of adrenalin. Dietlen has seen a diminution in the volume of the heart in erect position.

At the beginning of the war it was mainly irritability of the heart that was found; later on real heart disease was seen from overstrain of the myocardium; then, too, men were taken on later, who had not been fit for military service during peace.

Nobecourt et Peyre found dilitation in soldiers, who had had cervical rheumatism, sciatica, hypertension, albuminuria, lymphocytosis of the cephalo-rachidienliquor, or inorganic lesions—79 cases of cardiac diseases in 92.

MacKenzie does not agree with the preceding authors. He does not think that soldier's heart tends to dilitation; but exhaustion. Kramer, a Dutch army surgeon says that prolonged marching engenders dilitation and accidental blowing sound.

Heller reports the results on 3000 Austrian cases. He divides his cases into small, normal and medium hearts.

Moncheberg gives postmartem examinations of the heart. Dietlen and Staub studied the small heart.

Summing up, the author says that the war cannot be said to have been an immediate cause of cardiac disease. Arteriosclerosis was found in an unusnal degree even in younger soldiers, maybe due to morale, physical fatigue and tobacco. O. Mueller thinks that frequent arterial rigidity was more of a spasmodic nature. French physicians partly attributed the arterial hypertension without apparent heart lesion to excessive use of meat. The question of tobacco was answered in different ways, and probably racial affinity plays a part in it. Extrasystolic action has various causes. It is of no importance, except in people over 50 years of age, and if it persists and diminishes the heart's size. Paroxysmal tachycardia arises from extrinsic nervous causes, or from alterations of the myocardium and many causes. If the pressure diminishes during effort, heart-dilatation is near. If in permanent palpitation and dyspnea on exertion pressure remains high. Attention must be given to cardiorenal disease.

Varying pulse and lack of rhythm (pulsus irregularis perpetuus) are signs of complete incompetency. In bradycardia (Stoke's-Adams) is found the typical icterus heart or digitalis heart, that is, false diminution of speed. The His band is diseased, especially in the aged, if syphilis is not the cause.

Plehn gives as an etiology of the "war heart": (1) Toxic disturbances of the cardiac innervation, tobacco, alcohol, quinin.

(2) Neurasthenia, defective function of vagus and sympathetic nerve, frequency of small heart.

(3) Psychic influence in muscular weakness, care, general worry about everything.

(4) Weak muscular tonus, which is rarely observed in the volunteers.

Rhythmical defects are frequent. Often, they are accompanied by dyspnea after exertion and extracardiac murmur. Repeated examinations are necessary to state, whether the cause be functional or organic. The functional murmurs have been observed by Thorach, Schottmuller, Graul, Gerhardt in the second intercostal space, and are supposed to be of organic nature. The author saw neither in 4000 cases of German prisoners—aggravation of pre-war heart disease, nor recent valvular disease. Peasants showed much arteriosclerosis.

HYGIENE AND PUBLIC HEALTH

SCHWEITZER, A. E.: Report of the Division of Infant and Child Hygiene, Indiana State Board of Health, for the Year Ending September 30, 1920. General Observations.

Foreword.—The Division of Infant and Child Hygiene, Indiana State Board of Health, began its official existence October first 1919. Previous to that time the Child Hygiene work was merged with the work of other Divisions. That much had already been accomplished in the prevention of infant mortality is shown by the Statistical Records. The infant mortality rate in a commonwealth is a fair index of the general health status. It is fixed by the number of deaths under one year out of each 1,000 births. In China, 779 babies die out of every 1,000 born; in the United States the rate is 94; in New Zealand 48. In Indiana, for the five years beginning with 1910, the average rate was 96. For the following five years ending with 1919, the rate was 85, a saving of eleven out of a thousand or a total of 3,446 babies' lives.

On the same basis and for the same years, the reduction in maternal mortality was only eight-tenths of one point. When a mother dies at her baby's birth, or when a baby dies at birth or soon after, in nine-tenths of the cases some safe guard to pregnancy has been either neglected or overlooked. Analysis of causes of early baby deaths shows that five-eigths of them are due to premature births alone. Obviously most of these could have been prevented. Among the causes of mother deaths, puerperal septicemia is responsible for about one-half. If the coming of a new baby were as carefully prepared for as a major surgical operation and all family and neighborhood meddlers were excluded, practically all these deaths could be prevented. The doctor called at the last possible moment to meet this most important emergency in the home is placed at a great disadvantage. When doctors are asked at the beginning of a pregnancy to supervise the entire period, they will be able to save many lives. Except in emergencies, many doctors are refusing to take the responsibility of an obstetric case that has not been so supervised. On the trip up the St. Lawrence River an experienced pilot steers the boat safely. But when the Rapids are reached, a special pilot who knows every whirlpool and every hidden rock comes on board and takes the wheel. Expectant motherhood should be no less skillfully piloted.

Purpose.—The education of the public in matters pertaining to healthy parenthood and childhood, and the establishing of such measures as shall be best adapted to the practical attainment of this purpose are the chief purposes of this Division.

General Plan.—This had to be adapted to the funds at hand. (As there was some delay in organization, not much of the fund was used prior to May, 1920. This enabled the Division to have pamphlets printed and to carry on a fairly intensive campaign in the field, hiring extra help as needed. It will be impossible to continue this work throughout the coming year on the funds provided). To reach the largest possible number of persons, it was planned to conduct an educational campaign in one County in each congressional district. It was also decided to conduct such special campaigns as would reach unusually large numbers of persons or to assist communities in launching some health project.

Specific Plan.—In the County plan all organizations were asked to coöperate with the one extending the invitation to the Division.

County and township chairman were appointed; each in turn appointed committees to assist. Lists of these chairmen and lists of members of local medical societies were furnished to the Division. To each of these was sent a letter, and outline of work to be done, a tentative daily program, and a list of supplies furnished by the Child Hygiene Division and those to be furnished by local committees. Replies to a questionnaire gave us needed information concerning meeting places, electric voltage, hotels, etc. Truck mileage was kept as low as was consistent with efficiency of the work by conforming to good roads and the geographical access to towns.

The Work.—Office: Correspondence; advertising; writing pamphlets, form letters, etc.; compiling statistics.

Field: Placing exhibits; giving lectures and moving picture shows; giving special demonstrations in mother and baby care, food, etc.; physical examination of children.

Routine: To facilitate the examination of pre-school children the clothing was replaced by shaker flannel blankets of uniform size. School children not accompained by parents had the chest exposed but were undressed only for special examinations.

An official chart of the history and physical examination of each child was made for filing and a copy was given to the parent with any needed advice. Studies based on these charts reveal many interesting facts.

Vision and Hearing.—Statistics compiled from our records show that 15½ per cent of the children have defects of vision that need correction, and about 4 per cent have marked defects of hearing.

Tonsils and Adenoids.—Fifty per cent have overgrown adenoid tissue, which is obstructing breathing, or tonsil infections of varying degrees of severity.

Teeth.—Dental defects average three to a child among the children over two years of age.

Infection.—Either infected teeth or tonsils or both had already been responsible for cases of acute articular rheumatism, or valvular heart affections.

Defects Corrected.—There is however a rapidly increasing number of children who have had dental defects corrected and troublesome tonsils and adenoids removed. These have always improved in nutrition and in general health.

Nutrition.—Nutrition statistics have not been completed. To date however they show few children who are perfectly proportioned, although many in good health are somewhat below average weight for height.

About 7 per cent of the children are 10 per cent or more below weight for height, and should have medical supervision until the cause of poor nutrition is found and corrected.

Many of these cases date back to lack of prenatal care of the Mother, or to incorrect feeding in infancy.

Breast Feeding.—Maternal nursing is the baby's birth right and every effort should be made to provide mother's milk for the baby. Yet in 14 per cent of the children studied, the feeding was wholly artificial, in 21 per cent the baby was breast fed from two weeks to six or seven months, while in 65 per cent the feeding was maternal exclusively.

Scientific investigators tell us that the baby and mother both have better health if the baby is weaned by the end of the first year. The records show that 52 babies were nursed fifteen months, 126 from sixteen to eighteen months, and 51 from nineteen to twenty-four months.

Food after Weaning.—Incorrect feeding after weaning was also a source not only of poor nutrition but of many acute digestive upsets. A comparative study of the status of communities with respect to these points is being prepared.

Fresh Air.—Many children are poorly nourished because of wrong living conditions. Young children should sleep alone if possible and in the open air or in freshly aired rooms. About one-half of the children studied sleep alone, slightly more than half have slept or are sleeping with one or more windows open; it must be remembered that this study was made during the warm

months. From one-fifth to one-half begin to close their windows as the cold weather approached.

Amount of Sleep.—The amount of sleep needed by growing children varies with the individual child; the nervous irritable child needs more. On the average, the child of four years should sleep at least 12 hours, the child of five to seven, 11 to 12 hours, the child of eight to eleven, from 9 to 10 hours every day. In a few studies completed, 52 per cent of children from three to five years, and 60 per cent of children from five to seven years, are getting only the minimum amount of sleep required or less.

Home Conditions.—Milk.—A Study of home conditions shows that many families are using considerably less milk than is needed for the proper growth of their children.

Water.—The water supply is not always above question and is often inadequate.

Garbage.—The disposal of garbage usually is governed by local custom. In some communities the existing surface privies are most offensive and in other places no provision whatever is made for the disposal of human waste. Some homes even in rural districts have all modern sanitary conveniences.

Housing.—We have found that it is unsafe to judge the adequacy of housing conditions by the number of rooms in the house. We must know how many rooms are actually used by the family and whether or not they are sufficiently warm in winter or cool in summer and whether the lighting and ventilation are adequate.

Mental Tests.—In nearly every community visited, special examinations were requested for retarded children. In some cases physical defects were causing retardation, in others the children were mentally defective. The degree of mental defectiveness varied from idiot to moron. In communities having much defectiveness and insanity, school children often failed of promotion for two or three years in succession. Partial loss of speech in one fine girl, and marked nervous instability were found to have been caused by profound shock. A chance at readjustment under favorable conditions was advised.

Prenatal Care.—Marked defects due to disease of parents, or to injuries at birth were found. These are arguments for healthy parenthood and for adequate prenatal supervision. The most potent argument of all is the healthy baby, strong and vigorous whose coming was carefully planned for. He sleeps, eats and grows as a baby should. Sleeping he smiles and waking he faces the future with the joyous confidence that the World is his—and it is. It is the hope of the Child Hygiene Division that in the coming year, 100 per cent of expectant mothers will place themselves under adequate supervision, cease to worry, and bring into the world healthy babies that will live.

Summary.—From May until October the Child Hygiene Division worked in eleven counties. In three of these the County was worked by townships. Invitations came from Red Cross Organizations, from County Nurses, a Home Economics County Demonstrator, Directors of Winona Assembly, Dispensary Doctors, League of Women Voters, and the State Board of Agriculture and County Health officers, and American Legion. In the regular County work, lectures illustrated by moving pictures were usually given on the evening preceding the day for examination of children. During the day of the examination, demonstrations in baby care were given when possible. One day was given to the smaller towns and two or three days to larger ones. This work was done in Hancock County, Hendricks County and Newton County. Housing surveys were made only when undertaken by local committees. Local committees were also responsible for registration of children, clerical work and music for evening programs, etc. In many towns children gave numbers of the program.

Boone County.—In Boone County a "Know Your Community Better" study was made in coöperation with other State Departments and the Lake Division of the Red Cross.

Winona Lake.—At Winona Lake a model

Demonstration of Community Health activities was given daily, the examinations of children occurring in the forenoon. Afternoons and evenings were devoted to demonstrations and lectures. These children represented thirty Indiana towns, four Pennsylvania towns, three towns each in Illinois and Ohio, two in Oklahoma, one each in California, Massachusetts, Missouri, Florida, Kentucky and New York, while four little children were born on the west coast of Africa.

State Fair.—At the State Fair, exhibits showed principles of baby care. Baby Health Conferences were held on Monday, Tuesday and Friday, and Baby Contests on Wednesday and Thursday. About 36,000 persons saw the work.

Elkhart.—Elkhart asked for assistance in starting Baby Health Stations and Clinics. An address before the Academy of Medicine enlisted the coöperation of the doctors, who worked for four forenoons in squads of four to ten in examining the children. Demonstrations to mothers and to High School girls and teachers were given afternoons. In the evenings, the Child Hygiene moving pictures were shown twice at the church headquarters and twice in the Bucklen Theater. Duplicate records of the results of the examination were made by the local Child Hygiene nurse and all the babies were invited to come regularly to the Health Station. Since that time 54 additional babies have been registered for regular examinations.

South Bend.—During the meeting of the State Medical Association at South Bend, the Child Hygiene exhibit was placed at the Children's Dispensary and was viewed not only by dispensary patients but by many who took this occasion to visit both the Dispensary and the exhibit. A reception was given to visiting doctors and their wives. The moving pictures were shown twice outdoors near the Dispensary, once at the Central High School and in two of the schools in the industrial sections of the city.

Others.—At Fairs at North Vernon, Greensburg and Salem rest tents or rooms for mothers and babies were conducted by Staff nurses in coöperation with local agencies.

Results.—Some good results of the Child Health Campaigns are already apparent. Many children have had defects corrected and have already begun to gain in weight and in ability to study successfully. Many children are taking food better adapted to their needs and are giving up irregular habits of eating. Many are getting more sleep. Some have been taken from school and placed under medical supervision to arrest a beginning tuberculosis. Some have been relieved of a burden of work or responsibility too great for growing children. Many are forming correct habits of standing, sitting and breathing. Many by following simple hygienic rules are being saved from slow poisoning of chronic constipation. In a few cases the child has been at war with his environment. A discovery of the cause and a change in his mental attitude has improved his physical condition and has saved him from delinquency or insanity or both. The few cases that are unusual or spectacular attract much attention. The chief value of the work will be found in such improvement in present conditions that every child may have his chance to grow and develop in a normal manner. Could we insure to every child a normal healthy development, the future stability of our nation would be assured.

LANGSTEIN, L. AND ROTT, F.: Die zukünftige Gestaltung der Sauglingsfürsorge. *Deutsche medizinische Wochenschrift*, April 24, 1919, xlv, No. 17, pp. 453-455.

Scientific study has shown that the reason for infant mortality lies mainly in errors in diet and care, due to (1) lack of understanding on the part of the mother as to the proper care of the child, and (2) unfavorable economic status of the parents.

The author, therefore, recommends that the mothers be educated in the care of their children, and that instruction in care of in-

fants be introduced into the schools. This plan has been developing during the war, and the ground has been broken for a new course of instruction, in the preparation of the teachings for such courses.

In addition, physicians and students should be trained as soon as possible in pediatrics and care of infants. General practitioners cannot become specialists in this branch by means of extension courses alone. The foundation must be more carefully laid. The practioner must be a pediatrist from the beginning.

Bureaus for infant welfare should be opened under the supervision of trained and efficient specialists, nurses, and social workers. In country districts, where medical attention cannot always be quickly obtained, the nurse trained in infant care is especially essential.

A ministerial regulation—extremely imperfect in form and scope—provides for the training of these nurses and workers. The author emphasizes the importance that the training be uniform all over Germany.

The Prussian provision for the training and state examination of the child-welfare workers seems to the author unsatisfactory. It requires a longer period of training than he considers necessary. One and a half years' instruction in a school for social-welfare, and training in nursing should suffice. It is necessary to reduce the time and expense connected with the training to a minimum, or the district bureaus will engage untrained assistants rather than put up with the cost and delay of waiting for trained workers. The midwives must be enlisted in the attempt to better conditions in the care of infants.

The attempt must be made to bring all infants within the reach of the organizations, either by propaganda or by compulsion. Both the illegitimate children and those of working women who are absent all day from home must be reached.

In spite of the low financial status of the empire, the national maternity welfare work must be continued, by means of maternity insurance and sick pensions, the costs to be borne by the national Health Insurance Bureau (Kraukenkasse). These bureaus must give more support than previously to maternity, infant, and child-welfare. But inasmuch as the Health Insurance Bureau can reach only its beneficiaries and the scope of infant-welfare work must necessarily be broader, the work of these bureaus must be incorporated in that of the child-welfare organizations, and the two organizations must work hand in hand, to provide for (1) maternity insurances, (2) financial relief for mother and child, and (3) social welfare work.

Provision must be made not only for the well but also for the sick children, by means of efficient medical attention, and, when necessary, institutional care. The author says, "we admit that there are important reasons, *in the interests of the medical profession,* against the treatment of sick infants by welfare institutions" (the italics are mine—Abstr.). The only way of reconciling these interests is family insurance, i. e., the combination of private and public infant-welfare work.

Government provision has been made for the care of illegitimate children, and should be further expanded. Guardians should be appointed, provision made for the adoption and industrial education of the children, and in the case of infants, the attempt should be made to have the mother nurse her child. The Mothers' Home, where the mother can live for a time after her confinement and nurse her child is preferable, by far, to the orphan or foundling asylum. The value of such Homes, even when mother and child remain together for only three months, has been statistically proven by the reduction in infant mortality where such provision is made. Also, such homes can be relatively primitive as "the naturally-fed infant does not require by any means as scrupulously hygienic care as does the artificially nourished."

Nursing homes for healthy infants are therefore not advisable for financial reasons, and also because they do not accomplish as good results as does individual care (i. e.,

the keeping of mother and child together as long as possible). After the critical time in the infant's life is passed, it may be sent to an asylum or adopted by a private family. In this connection, it is important that the institutional nurses, or the foster mother, be sufficiently well paid to ensure efficient care.

The present system of recording and the lack of uniformity of the health certificates in various districts, often causes delay in obtaining medical care for the child who has moved from one community to another. Also many records of scientific value in welfare work are lost. An improvement along this line is important.

Abt, I. A.: Prognosis of Disease in Infancy and Childhood. *Medical Clinics of North America,* July 1919, iii, No. 1, p. 1.

This is an adress on the proper attitude to assume toward problems of prognosis. Dr. Abt instances the factors to be considered in forming a judgment upon any case of illness, with particular reference to children. Age, inheritance, hygienic surroundings, intelligent parents, natural robustness, the nature of the disease, the stage of the disease, the known efficiency of available therapeutic measures, are some of the things that must be considered and balanced before passing judgment either on the immediate or more distant probabilities of any case.

He discusses the duty of the physician in imparting his judgment to the parents. Shall he always tell the whole truth, or should he shade it to spare the feelings of the grief-stricken parents? He advises tact, deliberation and conservative statement, not only for the sake of the parents, but to safeguard the dignity and honor of the profession. He concludes "A wise prognosticator (sic) must, first of all, be a well-trained physician. To be able to prognosticate the results of disease in infancy and childhood one must have a definite knowledge of disease, a wide experience and a sound judgment. In the words of Hippocrates, "Experience is fallacious, and judgment difficult."

Davin, J. P.: The Legislative History of Compulsory Health Insurance in the State of New York. *Medical Record,* Jan. 17, 1920, pp. 105-106.

The first bill for compulsory health insurance in New York State was defeated at the 1916 Session of the Legislature. In 1917 it was re-introduced. As the representative of the Medical Society of the County of New York, Dr. Davin was delegated to oppose this measure. At this session the manufactures, the labor unions and the great commercial organizations were also represented in opposition; in fact, Capital, Labor and Medicine were as one in opposing compulsory health insurance. Even at that time Dr. Davin discerned the political possibilities that lay within this form of legislation and declared it to be a fight to a finish between practical politics and the practice of medicine, adding at the same time that when politics began to tinker with life and death it was time to call a halt.

Although the bill was defeated, a commission was appointed to study the subject and report upon it. No appropriation, however, was granted for this purpose.

At the next session of the Legislature, labor had changed its front, and favored this measure. The other opposing forces were divided, and politics began to take a hand in the project. Again this measure failed to pass the Legislature.

Dr. Davin again appeared in opposition at the 1919 session of the Legislature. This measure again failed, against the united efforts of the Governor and of both parties in the Legislature.

We are now confronted with the declared intention of the Governor, backed by the State Federation of Labor, and by the political advocates of so-called welfare legislation in both parties, to pass a measure for compusory health insurance at the next session of the Legislature. In this determina-

tion the Governor seems anxious to emulate Bismarck in making the medical profession in this country an adjunct of the State under political control instead of an independent vocation such as it has been up to the present time. As such, unaided by the State, medicine has exerted a beneficent influence in the affairs of mankind which has more than equaled the achievements of politics, jurisprudence and industry, as far as they relate to the welfare of mankind in general.

DIAGNOSIS

Pardue, H. E. B.: An Electrocardiographic Sign of Coronary Artery Obstruction. *Archives of Internal Medicine,* 1920, xxvi, 244-257.

A patient who had just had an attack of typical occlusion of a coronary artery showed a very remarkable electrocardiogram.

The patient recovered and the electrocardiogram had changed on the fourth day to a form which it retained during the four months which the patient remained under observation. Two years later, the patient died with a typical attack of angina pectoris.

Five other records have been found showing characteristics similar to the later records of case discussed. Four of these had typical attacks of anginal pain, while the fifth had slight precordial pain on exertion. Autopsy in one case showed large areas of muscle degeneration at the apex of the ventricles; the form of the electrocardiogram in these cases is what might be expected theoretically with a large area of degeneration in the ventricular muscle.

Experimental work on dogs also bears out theoretical considerations, producing changes in their records similar to those in the case here reported both at the time of the obstruction and later.

The following characteristic changes appear a day or two after the obstruction: The Q-R-S group is usually notched in at least two leads, usually showing left ventricular predominance. The T-wave does not start from the zero level of the record in either Lead I or Lead III though, perhaps, from a level not far removed from it, and in this lead quickly turns away from its starting point in a sharp curve, without the short straight stretch so evident in normal records preceding the peak of the T-wave. The T-wave is usually of larger size than customary, showing accordingly a somewhat sharper peak. It is usually turned downward in Lead II and in one other lead. Enough of these changes are found in every record to give a characteristic appearance.

It is concluded that this electrocardiographic sign indicates the presence of a rather large area of muscle degeneration, and in connection with a history of precordial pain in attacks or upon exertion, it will complete the diagnosis of obstruction of a branch of a coronary artery. It is suggested that this sign results only from a lesion within the area supplied by the left coronary artery, and that one within the area of the right coronary artery would cause changes producing a record resembling more or less that which follows a lesion of the right branch of the auriculoventricular bundle.

Hewlett, A. W.: Recent Advances in the Diagnosis of the Heart Disease. *Northwest Medicine,* Sept. 1920, xix, 224-226.

Prominent among the newer methods of diagnosis in heart disease are: (1) the estimation of blood-pressure in man, (2) the recording of cardiac activity by means of ve-

nous tracings and electrocardiograms, and (3) increased accuracy in determining the size and shape of the heart through the application of *x*-ray methods. Among the newer studies are those which have demonstrated the relation of certain infections, especially syphilitic and streptococcic, to heart disease, known as the "irritable heart".

The diagnosis of heart disease is often influenced to an unwarranted degree by the presence and charcter of murmurs. Heart murmurs do not necessarily indicate valvular or other organic disease in the heart. This is particularly true of systolic murmurs. Thomas Lewis, after an extensive army experience, even advises that systolic murmurs be disregarded altogether in cardiac diagnosis. While the author is unable to subscribe to this view, he does believe that too much importance is frequently attached to the finding of systolic murmurs and is convinced that Lewis' protest against this will in the end be productive of much good. As less significance is now attached to systolic murmurs, the significance of diastolic murmurs has not diminished. Whether these originate at the aortic or at the mitral orifice, they nearly always indicate valvular disease, and the lesions indicated, either aortic insufficiency or mitral stenosis, should never be taken lightly. Diastolic murmurs are of much importance and special care must be taken not to overlook their presence. The murmur of aortic insufficiency is usually loudest in the third or fourth intercostal space close to the left border of the sternum. Careful auscultation at the proper place will usually reveal any abnormality. The murmur of mitral stenosis is frequently limited to a small area over the cardiac apex. It may be louder in either the upright or the recumbent position and frequently becomes louder after a little exercise. The murmur of mitral stenosis is typically presystolic only when the auricles are active. The study of soldiers suffering for "irritable heart" has emphasized the fact that in some instances their symptoms may suggest an organic heart lesion. These patients frequently complain of breathlessness and pain about the heart on exertion, of palpitation, dizziness and fainting. The definite relation between exertion and the severity of the symptoms may awaken a suspicion of serious progressive disease. In cardiac enlargement a violent throbbling apex beat may be seen and felt beyond the normal limits, even though the accurate determination of the cardiac size by radiographic methods shows no enlargement. On the other hand, enlargement of the heart may escape detection by physical methods. In elderly patients, particularly, emphysema of the lung borders is common, and when present, the apex beat may not be felt and the cardiac dulness may not be enlarged, even though radiographic examination shows an indisputable increase of the heart shadow. Accurate measurements of the heart shadow require an orthodiagraph or a six-foot plate.

For ordinary clinical purposes, however, these are hardly necessary, for unless the heart shadow easily exceeds the normal average it does not possess much clinical significance, and increases of this magnitude are readily recognized in any ordinary chest plate. Modern studies of the cardiac rhythm have proved of no little value as aid in guaging the seriousness of a cardiac lesion. Respiratory irregularities, for example are of nervous origin. On the other hand, auricular fibrillation, complete heart-block, and the pulsus alternans always mean serious cardiac change.

In the examination of patients an accurate history and a correct interpretation of the symptoms elicited is still of great importance. The more recent additions to diagnosis have served to furnish new objective evidence to cardiac disease.

Nobecourt, P.: Inspection, Palpation, Percussion. (L'examen du coeur chez les enfants.) *Le Progrés médicale*, Sept. 18, 1920, p. 410.

Nobecourt emphasizes the necessity of examining the heart of all children as cardiopathies very frequently remain latent. To

begin with, inspection of the precardiac region shows that in the child as in the adult this surface under normal conditions is symmetrical. Deformities of the precardiac regions are often seen independent of any cardiopathy. Rickets causes curvature of the ribs; scoliosis or kyphosis causes false outward curving of the precardiac region. If these causes of error are eliminated, an outward bulging of the anterior costal wall shows that there is an increase of the size of the heart, hypertrophy or dilatation. A child with a mitral disease showed this characteristic outward bulging of elongated form in the vertical sense at the level of the 3rd, 4th and 5th ribs. These bulgings are also seen in cases of pericardial effusions but it is more extensive than in a cardiac dilatation or hypertrophy.

Some special movements of the precardiac region may also be observed. In some nervous and impressionable patients, the heart begins to beat with rapidity and strength. Alternate rise and fall of the upper part of the lower half of the precardiac region as described by Jacond, are also seen. These symptoms are first indicative of mediastinitis, of adherences produced between the external surface of the pericardium, the pleura and the costal wall. Palpation allows us to study with greater precision the apex beat. Palpation along the sternum at the level of the 2nd intercostal space shows quite frequently in young children a kind of small diastolic beat corresponding to the closing of the pulmonary sigmoid valves, which is a normal symptom of no importance whatever. Palpation also enables us to perceive the diastolic beat, the gallop rhythm of hypertrophied hearts. But the principal signs on palpation are the purring fremitus and precardiac friction sound. The former shows valvular disease or an aneurysm. It may be present at the apex of the heart, at its base or in the middle. It is most often found at the apex. If the hand is placed broadly over the apex, a systolic purring fremitus will be felt. In some cases there will be a prolonged fremitus beginning at the diastole and continuing until the end of the systole which indicates that there is mitral insufficiency and contraction. In order to find both fremitus, systolic and diastolic, one must be able to palpate the precardiac region farther out than the normal limits in case the heart is considerably hypertrophied. If both fremitus are felt, the diagnosis of mitral disease may be made even before auscultation. A fremitus may also be felt in the region of the base of the heart, at the right and left of the sternum. Diastolic fremitus in children is quite frequent, because it is not rare to find an aortic insufficiency at the same time as a mitral insufficiency, but it is to be found very low towards the xiphoid appendix. But we find more frequently in children than in adults a systolic purring fremitus at the left of the sternum in the pulmonary region extending to the clavicle and indicating a contraction of the pulmonary artery. But this sign may be absent. In the median region, at about the 3rd intercostal space or the 4th rib at the level of the sternum, a superficial systolic fremitus quite vibrant and pronounced, indicates an interventricular communication. This fremitus of the middle part and that of the base are difficult to differentiate because the heart is small. Besides, it is known that there is often coexistence of these two cardiac malformations, the interventricular communication and the contraction of the pulmonary artery. The purring fremitus must be differentiated from the pericardiac friction which is harsh, dry, superficial and rasping and present at the systole or diastole and very often at both. Pericardial effusions are the most common cause of this symptom. Percussion can also give caluable aid as to the size of the heart. Potain's concentric percussion method must be used but tapping more gently than with adults.

The area of precardiac dulness is measured by correcting the product of ABxBCxS by 0.83. According to Potain and Vasquez, it measures on an average 40 c. c^2 at 6 years, 52 c. c^2 at 12 years and 78 c. c^2 at 17 years of age. Increase of the precardiac area of dulness is an important sign of peri-

cardiac effusions. At the beginning of the pericarditis, while it is still dry there may often be a minimal increase of this area of dulness. Rautsch's sign of triangular dulness may be considered pathognomonic. However, some children with simple dilation of the right cavities show this symptom with no pericardiac effusions. The finding of a lessened dulness towards the 4th, 5th or 6th dorsal vertebra on the left side corresponds to a dilatation of the left auricle. Radioscopy almost always confirms this diagnosis. It is a very valuable symptom which allows us to confirm the diagnosis of mitral contraction.

TRAUGOTT, K.: Zur Diagnose der Herzbeutelargusse. *Münchener medizinische Wochenschrift,* Aug. 27, 1920, lxvii, 1010.

Traugott reports the case of a woman of 31 who was admitted to the hospital for dyspnea and pain in her chest. Ten days before, she suddenly became ill in a restaurant, had an attack of vomiting and fainted. After some time she recovered and went home and went to bed. At examination the case was diagnosed as chronic renal disease and beginning cardiac insufficiency. The *x*-ray showed the shadow of a very large aortic heart. The patient died four days after her entrance into the hospital. The autopsy showed a spontaneous rupture of the aorta just above the valves with extensive aneurysma dissecans and a pericardial effusion of 700 c. c., subchronic glomerular nephritis, edema of the lungs, congested liver and spleen.

Traugott believes that when the patient fainted the aortic rupture took place, although it is quite unusual for patients to live so long after a rupture (fifteen days). The roentgen picture did not show the usual large pericardial effusion shadow of triangular or tobacco pouch form. Traugott attempted to solve the problem experimentally and filled intact pericardiums with liquid beginning with 100 c. c., and rising to 450 c. c. He never succeeded in numerous experiments either by a slight degree or a pronounced degree of liquid in producing a double shadow on the *x*-ray screen or plate. He also experimented with liquids of varying specific gravities and did not succeed in producing a trace of a double shadow. Traugott therefore concludes:

(1) From the case reported it is evident that with great effusions into the intact pericardium which is not altered in its elasticity the cardiohepatic angle is not necessarily filled out, and the pericardium shadow corresponds in contour to that of a hypertrophied heart.

Traugott also concludes from his experiments that double contours contrary to the contention of Schultze, Schwaer and Paetsch are rare occurrences in pericardial effusions.

CHEMICAL PHYSIOLOGY, SEROLOGY AND EXPERIMENTAL MEDICINE

GRADWOHL, R. B. H. AND BLAIVAS, A. J.: The Newer Methods of Blood and Urine Chemistry. Vol. I, 2nd Ed., St. Louis, Mosby, 1920, p. 73.

Gradwohl and Blaivas recommend Marriott's method for the determination of the alkali reserve of the blood-plasma.

Apparatus Required.—Set of tubes containing standard phosphate mixtures; an 0.8 per cent solution of phenolsulphonephthalein; sodium chlorid; collodion sacks; pipet to measure 0.5 c. c.; small test-tubes for dialyzing and aerating; atomizer bulb; glass tube or pipet drawn out to a fine capillary point; color comparison box.

Preparation of Phosphate Mixtures.—One fifteenth molecular acid potassium phosphate. Dissolve 9.078 grains of the pure recrystallized salt (KH_2PO_4) in freshly dis-

tilled water. Add 200 c. c. of 0.01 per cent phenolsulphonephthalein and make up the whole to 1 liter with distilled water.

One-fifteenth Molecular Alkaline Sodium Phosphate.—Expose the pure, recrystallized salt (NA_2 HPO_4 $2H_2O$) to the air for from ten days to two weeks, protected from dust. Ten molecules of water of crystallization are given off and a salt of the formula Na_2HPO_4 $2H_2O$ is obtained. Dissolve 11.876 grams of this salt in distilled water. Add 200 c. c. of 0.01 per cent of phenolsulphonephthalein and make up the whole to one liter. The exact amount of indicator is immaterial provided the same amount of indicator is added to each of the phosphate solutions, and a corresponding amount is added to the salt solution, to be subsequently described. Add a small crystal of thymol to each solution to prevent the growth of molds. The solution should be preserved in Jena or non-sol glass vessels. Mix the solutions in the proportions indicated below to obtain the desired pH.

pH	7.0	7.2	7.4	7.6	7.8	8.0	8.2	8.4	8.6
Prim. sod. phos. c.c.	37.0	27.0	19.0	13.2	8.8	5.6	3.2	2.0	1.0
Sec. sod. phos. c.c.	68.0	73.0	81.0	86.8	91.2	94.4	96.8	98.0	99.0

Place these solutions in small test-tubes, approximating 100 mm. long by 8 mm. internal diameter, of glass that does not readily give off alkali. The tubes are stoppered or sealed off. They should be kept in a dark place when not in use. Under these conditions, the solutions retain their colors for long periods of time.

Preparation of Salt Solution.—Dissolve 8 grams of chemically pure sodium chlorid in distilled water. Add 220 c. c. of 0.01 per cent phenolsulphonephthalein solution and make up the whole to one liter with distilled water. The solution should contain no free alkali and no acid other than carbonic. Test the solution by boiling a little of it for a minute or so in a Jena glass test-tube, in order to expel carbonic acid. Cool the solution quickly under the tap and compare with the phosphate standards. Its reaction should be 7.0. If the reaction differs from this, it may be corrected by the addition of a few drops of very dilute acid or alkali to the whole solution. The salt solution must be kept in a vessel of Jena or non-sol glass, or in a vessel of ordinary glass, that has been well paraffined on the inside.

Method of Determination.—The determination must be carried out in a room free from acid or ammonia fumes. Either serum, oxalated plasma or blood may be used. Serum is to be preferred, as the addition of oxalate, unless exactly neutral, introduces a source of error. The blood should be collected in a small tube and the serum separated as quickly as possible, preferably by centrifuging. Hemolysis must be avoided. Pipet exactly 0.5 c. c. of serum into one of the small, collodion sacks which has previously been washed inside and out with the salt solution. Lower the sack into a small test-tube, approximately 8 mm. internal diameter and 50 mm. long, containing 2 c. c. of the indicator salt solution. The level of the fluid on the outside of the sack should be at least as high as that on the inside. At the end of seven minutes remove the sack and transfer the dialysate to a clean test tube 100 to 140 mm. long and having the same diameter as the tubes containing the phosphate standards. A rapid current of air is bubbled through the solution in order to remove carbon dioxid. This is accomplished by means of an atomizer bulb connected with a narrow glass tube drawn out to a capillary point. The air current should be as rapid as possible without blowing liquid out of the test-tube. Continue blowing for three minutes and then compare the color in the tube with that in the standard phosphate tubes, interpolating when necessary. The reading is a meausre of the reserve alkalinity.

Results Obtained.—The serum of a normal adult was examined and the reserve alkalinity was found to be 8.5+0.05, provided the subject examined was on a general mixed diet. After a fast of sixteen hours, the reserve alkalinity was 8.35. Normal infants under one year of age not infrequently gave a value of 8.3.

KLEWITZ, F.: Electrocardiography in the Clinic. *Deutches Archiv für Klinische Medizin,* 1919, cxxix, 41; abs. *Journal of the American Medical Association,* 1920, lxxiv, 1682.

Several hundred electrocardiographic curves are analyzed from 88 persons, twelve of whom had sound hearts. The negative T-peak occurred only in cases of organic heart disease, especially myocardium. This is also true where the T-peak is lacking, but the prognosis is not so grave as with the negative T-peak. A positive T-peak does not entirely exclude organic heart disease, but the prognosis is more favorable with a positive or weakly positive T-peak. Pressure on the vagus affects the rate of contraction in both the healthy and those with heart disease; a dromotropic effect showed only with organically diseased hearts. Necropsy findings are given where the T-peak had been absent in life or had been present at first, disappearing as the disease progressed.

WILSON, F. N., AND HERRMAN, G. R.: Bundle Branch Block and Arborization Block. *Archives of Internal Medicine,* 1920, xxvi 153-191.

The field of cardiac irregularities has been very thoroughly covered by electrocardiographers and present research is directed to the significance of abnormalities in the form of the electrocardiographic deflections. Previous work on bundle branch block is reviewed and methods are analyzed, with clinical observations. The following conclusions are reached:

Complete bundle branch block produces characteristic changes in the form of the ventricular complex both in animals and in man.

Delayed conduction of the impulse through the branches of the His bundle (incomplete bundle branch block) produces ventricular complexes which are transitional in form between normal ventricular complex and complexes characteristic of bundle branch block.

The T-deflection is produced by the deactivation of the ventricular muscle. In Lead II of the dog the upstroke of T in right bundle branch block is mainly a left ventricular effect; the downstroke of T in left bundle branch block is mainly a right ventricular effect.

There is little experimental evidence to indicate that lesions of the subdivisions of the branches of the His bundle or their arborizations produce those changes in the form of the ventricular complex usually attributed to arborization block. Until such evidence is brought forward the diagnosis of arborization block rests on an insecure foundation.

SMITH, F. M.: Experimental Observations on the Atypical Q-R-S Waves of the Electrocardigram of the Dog. *Archives of Internal Medicine,* 1920, xxvi, 205-220.

A transverse slit was made in the interventricular septum just below the aortic valves in three dogs, cutting both branches of the auriculoventricular bundle. In one instance a short shallow incision was made on the left ventricular side of the septum, dividing the left branch of the auriculoventricular bundle. In one dog the right branch of the auriculoventricular bundle was divided by an incision in the long axis of the interventricular septum. In eleven dogs, incisions were made in the endocardium of the left ventricle.

Electrocardiograms taken after one or both branches of the auriculoventricular bundle were divided showed some increase in the width of the R-wave; in some instances it was notched. In the one instance where the right branch was cut, there was an S-wave in Lead III. Normal electrocardiograms were yielded where there were extensive incisions in the endocardium of the left ventricle. Later as the ventricles became dilated and the contraction atypical, the electrocardiograms became abnormal in all instances.

Cardiac failure alone was not responsible for the abnormal electrocardiograms in these experiments. Hearts subjected to special strain by increasing the load and ligating the coronary arteries never produced an electrocardiogram with atypical Q-R-S waves. If, however, the endocardium of the left ventricle was incised these waves became abnormal. These experiments would indicate that at least two factors are necessary for the production of the abnormal electrocardiogram under consideration—lesions of the conduction system and cardiac fatigue.

Daly, I. D. B., and Shellshear, K. E.: The Use of Thermionic Valves with the String Galvanometer. *Journal of Physiology,* 1920, liv, 287-291.

This is a discussion of the use of thermionic valves with the string galvanometer in obtaining magnified electrical variations. Good results have been obtained with the use of an aperiodic circuit devised by Dr. W. H. Eccles consisting of a valve placed in one area of Wheatstone's Bridge. A full description is given of the difficulties encountered in adjusting and maintaining a balance of the circuit, and avoiding oscillations due to outside electrical disturbances.

Greene, C. H.: Changes in Nitrogenous Extractives in the Muscular Tissue of the King Salmon During the Fast of the Spawning Migration. *Journal of Biological Chemistry,* xxxix, p. 457.

The analyses are based upon duplicates of samples reported in a preceding paper by the method of Jauney. They confirmed the results of C. W. Greene and extended them to the separation of the non-nitrogen fractions. They add considerable data of interest on the absorption of amino acids. The essential results are as follows:

(1) The total extractives in the fat-free tissue increase slightly during the greater part of the migration. The results agree with those of Hatai on the growing rat and indicate that the amount of extractives in the muscles is an index of the metabolic activity of these tisues. They also show that the percentage of nitrogen in the organic extractives remains approximately constant during the migration period and is therefore the same as that in the extractives as a whole.

(2) The non-protein aminonitrogen increases in percentage in the fat-free muscle during the migration, being, relatively to the protein from which it must be formed, nearly 100 per cent.

(3) The nitrogen concentration relative to the water in the muscle increases from 82 to 100 mg. per 100 gram of water coïncidently with the augmentation of catabolism at the beginning of the migration, and shows no further change during the migration. The amount of amino acids in the tissue is therefore dependent upon the volume of water present. This result adds another to the factors suggested by Van Slyke as controlling the amino acid content of the tissue. Van Slyke and Meyer demonstrated that in dogs the amino acids are absorbed into the blood stream, from which they rapidly disappear when the blood circulates through the tissues. They have shown further that this disappearance is due to absorption by the tissues and that this result is due neither to their destruction synthesis, nor chemical incorporation into the cell proteins, but merely to absorption from the blood. The amino acids of the blood appear to be in equilibrium with those in the tissues. In the liver these amino acids are rapidly metabolized, and this organ will take up more than muscle will. The muscles, however, reach a definite saturation point above which the amino acid content cannot be raised. The most probable explanation they offer is that of mechanical absorption or formation of loose molecular compounds between the amino acids and tissue proteins. The changes in the muscles of the salmon during the fast of spawning migration furnish evidence that the muscle-tissue is the source of

the free amino acids in the fasting body, and emphasize the fact that in salmon at least there exists a mechanism capable of maintaining the aminonitrogen at a constant level of saturation in the water present in the tissues, even though this water increases in amount during the fast. This water volume effect must therefore be considered in addition to those suggested by Van Slyke as probably controlling the amino acid content of the tissues.

(4) No attempt was made to determine creatin and creatinin separately. The figures for the total creatin showed great variability; its cause remains undiscovered. The creatin nitrogen in percentage of fat-free muscle revealed no constant variation in relation to the fast, contrary to the results of Howe and Hawk on fasting dogs. In fact, instead of decreasing, the creatin in salmon muscle increased in proportion to the protein residue. The present studies are inadequate to decide whether the relative constancy of the muscle content of creatin nitrogen is due to the liberation of increased amounts proportionate to the disintegration of muscle protein, or to the maintenance of a constant saturation of the muscle fluids.

(5) Discussing the general significance of the muscle changes during migration the author describes the mechanism concerned in the transference of material; he holds it to be still uncertain. He considers that the true factor regulating the catabolism of the muscle protein is probably the energy requirement of the salmon. In salmon, fats and protein are the sole energy-producing substances; the carbohydrate does not enter into the physiological economy of these fish. Fat, then, is the chief source of energy during spawning migration, but as migration proceeds more and more protein is catabolized. Protein is also consumed in the development of the growing genitalia. With the removal of amino acids from the blood, either by synthesis into genitalia or by oxidation, the equilibruim between blood and tissue amino acids is disturbed. In this state more tissue protein is broken down to bring the amino acid content back to the normal level. The great decrease in protein noted in the previous paper, which the author of the paper argues is stored protein, bears on this point.

Oliensis, A. E.: Sources of Error in the Estimation of Blood-pressure. *New York Medical Journal,* Feb. 28, 1920, cxi, 358.

From his studies Oliensis is convinced that the most fruitful source of error in sphygmanometry is the psychic state of the patient, and that to overcome this state it is not only necessary to reinsure the subject and to make frequent observations, but to check this up by taking the pressure in both arms, the lower reading being the one to be relied on.

The author believes that the diastolic pressure is the representative pressure, that it is more reliable and more stable; that is a good index of what the systolic pressure should be, and of the state of tonus of the peripheral vascular system; that the systolic pressure is only compensatory to the diastolic pressure and that it is not as reliable because it is largely influenced by the psychic state of the patient.

The pulse pressure is an indication of myocardial integrity; it is greatest in the recumbent position and least in the standing position, hence the most favorable position for patients with large pulse-pressure is the semiupright position, while for those with small pulse-pressure the recumbent posture is best.

The systolic pressure is highest in the recumbent position while the diastolic pressure is lowest in that posture, and, conversely, in the upright position the systolic pressure is lowest and the diastolic pressure is highest.

The tests for cardiac functional capacity, as carried out, are of little value, because of the psychic state of the patient, but, according to Oliensis, a fairly accurate estimation can be made by observing the pulse-pressure, particularly when the pressure is taken in both arms.

In concluding the paper the author emphasizes the harm that has been done by ill-advised attempts to reduce physiological hypertension, this reduction being frequently accomplished at the expense of the heart muscle. He warns, that no one should ever attempt to reduce hypertension unless it is excessive and dangerously high, or unless the diastolic pressure can be reduced at the same time, thus still maintaining a pulse pressure which is freely competent to carry on the circulation properly.

Conn, A. E.: A New Electrode for Use in Clinical Electrocardiography. *Archives Internal Medicine,* July 15, 1920, xxvi, No. 1, pp. 105-113.

It has become sufficiently clear that in taking human electrocardiograms there is overshooting of the string, a high resistance has probably developed at the site at which the electrodes have been applied to an individual. Overshooting is, of course, undesirable because it deforms the curve. A high metallic resistance interposed in the circuit does not cause this defect. The deformity is seen either when added resistance is introduced into the circuit or when a current passes. In the latter instance the overshooting is the greater, the greater the voltage. It has likewise become sufficiently clear, that if the resistance in the string-patient circuit is reduced below 2,000 ohms, the overshooting does not take place. It makes no difference as far as electrocardiography is concerned what is the reason of the overshooting, whether due to polarization at the electrodes or to a capacity effect in the cutaneous tissue as Pardee has suggested.

Provided, then, that the resistance is low, the form of electrode used is probably a matter of indifference. The electrode of choice is the one easiest to make. At the Hospital of the Rockefeller Institute, the electrode in use is made of a strip of lead foil 7.5 cm. wide by 22.0 cm. long and of a strip of rubber sheet 9.0 cm. wide by 30.0 cm. long. The two strips are fastened together about 8.0 cm. from one end by a brass screw, brass binding post and washers. No soldering is necessary. The manner of fastening permits the repeated use of the remaining portion of the lead foil if a break take place at the binding post. This accident after prolonged use is of course unavoidable.

In order to test and to establish the usefulness of these electrodes, electrocardiograms made with them were compared with others taken with immersion-non-polarized electrodes with the so-called plate electrodes, and with German silver electrodes. The plate electrodes were fashioned after the manner of those introduced by the Cambridge Instrument Company; those of German silver after the pattern described by Williams (W. B. James and H. B. Williams: The Electrocardiogram in Clinical Medicine. *Am. Jour. Med. Sc.,* 1910, cxl, 408); the nonpolarizable ones in a manner which is usual when the extremities are immersed.

In view of the practical identity of the heights of the waves all electrodes described may be used interchangeably. Electrodes used at the Hospital of the Rockefeller Institute are recommended because their construction is at least as simple as any other, and of the electrodes fastened to the limb they are smaller and easier to apply. They are by far the most comfortable, and can therefore be kept in place during prolonged observations. They answer the requirement that with them a low resistance can be attained, and a low resistance is the most important criterion in establishing the usefulness of electrodes. It is by no means uncommon to obtain resistances as low as 500 ohms.

Summary.—With all electrodes, electrocardiograms are deformed by overshooting of the string, when the resistance developed at the site of the application is high. Electrodes of simple construction are described. Electrocardiograms taken with them are identical with those taken by other electrodes, when the resistances are below 2,000 and comparable.

BARBOUR, H. G., AND HJORT, A. M.: Drugs After Chlorin Gassing. *Journal of Laboratory and Clinical medicine,* May, 1920, v, 477.

The Influence of Morphin Upon the Fatality of Chlorin Poisoning.—Forty-six dogs were gassed; of these 35 were treated with morphin sulphate subcutaneously injected, the remaining eleven being used as controls. Of the 11 untreated, one recovered. Of 19 treated 10 mg. per kilo body weight, only one recovered. Of 16 treated with from 3 to 5 mg. per kilo body weight, only two recovered.

STIVELMAN, B.: The Tuberculosis Complement Deviation Test. Its Present Status. *New York Medical Journal,* June 12, 1920, cxi, 1037.

Stivelman contends that when we consider the phase of phthisiology which deals with the differentiation between tuberculous disease and tuberculous infection, we realize that our older methods do not possess the accuracy that the solution of a problem of such importance deserves.

In the light of the modern conception of the tuberculosis problem no further proof is necessary to show that about ninety per cent of all civilized individuals have at one time or another been infected with the tubercle bacillus and that by far the greater majority have thus been adequately immunized against tuberculosis. It is also an admitted fact that in the Von Pirquet reaction and its various modifications, we have most efficient means of ascertaining the presence of tuberculous infection. On the other hand, no reliable biological or serological test has been elaborated for the diagnosis of tuberculous disease, and the author deplores the fact that one has to subscribe to the statement that "the tuberculosis complement fixation test in its present stage cannot serve the physician as a foundation for his diagnosis" (Editorial, on the Complement Deviation Reaction in Tuberculosis. *J. A. M. A.*, Aug. 9, 1919, lxxiii, 484) and when the diagnosis has been made the test throws no light on the activity of the process.

When the results of most reliable observers are carefully scrutinized they seem to show: 1. That positive fixation reactions are obtained only in fifty-five to seventy per cent of tuberculous individuals. 2. That twelve to twenty-four per cent of healthy non-tuberculous individuals give a positive reaction. 3. That the percentage of positive reactions is not much greater in those who suffer from an active tuberculous lesion than in those whose disease is not active.

In the author's opinion the tuberculosis complement deviation test must be accurate almost to the point of infallibility before it can be advanced over the older methods of diagnosis. The fact that over thirty per cent of tuberculous individuals give a negative reaction and twelve to tweny-four per cent of healthy non-tubercuolus individuals react positively, rocks the very foundation on which the claims for this test are based. "When a test", says Stivelman, "supposedly dependent upon specific antibodies which are demonstrable by complement deviation, gives no higher percentage of positive results in sthenic active cases than in inactive cases, the scientific data in the case are open to severe criticism." Stivelman justly bases this statement on a series of 700 cases in which Miller's antigen and a similar antigen prepared by the Health Department of the City of New York were used exclusively. The efficiency of both antigens was identical. Out of a total of 108 non-tuberculous patients the sera gave a positive reaction in 26, or 24 per cent. Out of 592 definitely tuberculous individuals, 310 or 52.4 per cent gave a positive reaction. Of the 294 active cases 178 or 80.5 per cent gave a positive reaction, and out of 298 inactive cases, 132 or 44.3 per cent reacted positively.

STIVELMAN, B.: The Tuberculosis Complement-Fixation Test. *Journal of Laboratory and Clinical Medicine,* April, 1920, v, No. 7, p. 453.

The tuberculosis complement-fixation test was performed on 700 consecutive cases admitted to a sanitarium, with the hope of ascertaining the diagnostic value of the test, what light does the test shed on the activity of the process when a diagnosis had been made, the relative value of the test in the different stages of the disease, and the prognostic value of the test.

Diagnostic Value.—Positive fixations were obtained in 24 per cent of 108 nontuberculous individuals. It is noteworthy that two of three cases of pulmonary abscess and two of six cases of bronchiectasis gave a positive reaction, thus rendering the correct diagnosis more difficult. The cases of chronic bronchitis and emphysema and those suffering from cardiac diseases gave a high percentage of positive reactions, but it must be emphasized that all nontuberculosis cases were observed for many months and were subjected to repeated and painstaking roentgenologic and physical examinations. Of 592 sera from definitely tuberculous individuals, 310 or 52 per cent gave a positive reaction and 292 or 47 per cent gave a negative reaction. Of the 282 cases, 176 had a positive sputum.

Relation of the Test to Activity of the Lesion.—Of 294 active cases, a positive reaction was obtained in 178, while of the 298 inactive cases, 132 reacted positively.

Relation of the Test to the Stage of the Disease.—Positive reaction was obtained in 49 of 147 incipient cases; 131 of 248 moderately advanced cases; 130 of 197 far advanced cases.

Relation of the Reaction to the Immediate Prognosis.—Of 258 cases whose tuberculosis fixation was positive on admission 195 left the institution in various degrees of betterment; while of the 270 cases whose fixation was negative on admission 229 left similarly improved.

Relation of the Reaction to Hemoptysis.—Of 108 patients who had pulmonary hemorrhage subsequent to admission, 43 had a negative fixation and 65 a positive fixation.

Relation of the Test to the Wassermann Reaction.—Among the 700 sera tested, 11 reacted strongly positive to the Wasserman test, or an incidence of syphilis of 1.6 per cent. Four of these cases had a positive sputum and a negative tuberculosis fixation test, and clinical evidence pointed to the coexistence of both diseases.

The conclusion was made that since 24 per cent of nontuberculous individuals and only 52.4 per cent of the definitely tuberculous gave a positive reaction, it would seem hazardous to permit the test in its present stage of development to influence our clinical judgment. The test did not help in differential diagnosis of pulmonary diseases. The clinical activity of the pulmonary tuberculosis could not be diagnosticated from the results of the complement-fixation test. The test sheds no light on the immediate prognosis. There is no reason to believe that a tendency to cross fixation with a Wassermann reaction really exists. The percentage of positive reactions increase as the disease advances, but in the definitely incipient tuberculous cases a positive reaction was obtained in only 33 per cent. Thus it is seen that where the test could be of greatest assistance it is least applicable.

INTERNAL MEDICINE

METCALF, W. B.: Tuberculosis of the Lymphatic System. New York, 1919, Macmillan.

Pages 174-175:

Tissue cells vary in regard to their sensitiveness to *x*-rays, those most effected being the ones that are rich in protoplasm and those with active metabolism. Pathological tissues composed of young and rapidly growing cells of low vitality offer little resistance to the rays. Cells of diseased tissues are more sensitive than are healthy ones and hyperemic tissues are more affected than anemic ones. Lymphoid cells are very susceptible to roentgen rays. The rays have a selective action upon the lymphoid tissues. The tuberculous lymph cells are destroyed and replaced by fibrous tissue cells, which cut off the further spread of the disease and isolate it in the lymph nodes, where it is finally overcome.

Giant cells are inactive and harbor tuberculosis bacilli, where they cannot be harmed by the leukocytes. *X*-rays rapidly destroy these giant cells and stimulate the leukocytes in their action against the bacilli.

Page 176:

Epitheloid and giant cells become degenerated, shrunken and finally disintegrated, and are replaced by a proliferation of fibroblasts, which are stimulated by the rays. The rays also cause hyperemia and a crowding of the vessels surrounding the lesion with leukocytes, which promote the absorption of inflammatory products, and the infiltration of the tissues with small round cells, which wall off the diseased areas by connective tissue formation, and thus favor healing.

Theories have been proposed that the *x*-rays have an auto-tuberculin or auto-vaccine effect, due to the liberation of tuberculin by the degeneration of the tubercles, or that the effect upon the bacilli may be to lessen the toxin formation, or to bring about a chemical change in the toxin.

Page 177:

X-rays reach lesions which are overlooked in surgery or which are inoperable.

Page 178:

"*The Erythema Dose.*—Kienböck employs a hard tube with a penetration above Benoist No. 6 at a distance of from 20 to 30 cm., and a filter of aluminum, glass or hard leather. If possible, he irradiates from various sides or angles. This cross-firing method is advantageous, for the diseased area may be treated and a different skin area exposed each time, thus obtaining the maximum absorption of rays where desired, with the minimum damage to the integument."

He usually applies the maximum superficial dose (erythema) and repeats it in three or four weeks, continuing treatments for months until the cure is accomplished. Pirie uses a filter and gives one-third of the dose required to produce epillation, as measured by Sabourand's pastilles, at intervals of a week. Hubeny gives one-half the erythema dose, seven to eight Wehnult, plus four millimeters of aluminum, three successive times at intervals of two weeks, then twice at intervals of three weeks, gradually increasing the intervals until eight treatments are given.

Dose for Children.—O. H. Petersen irradiates with hard rays obtained by means of an aluminum filter 3 mm. thick. As a single dose for adults and older children, he gives one-half the maximum dose; for younger children the dose is diminished.

Page 180:

The danger of these treatments lies in the

cumulative effect of the rays on the skin. According to Iselin the danger-border in the neck lies at about 6 full Sabourand doses filtered through 1 mm. of aluminum.

Local Reaction.—The first reactions are swelling and painfulness of the glands. Larger doses may be followed by malaise, nausea and vomiting. These symptoms call for careful regulation of the dose.

Ulcerating and fistulous lesions are most difficult and least favorable for treatment. They close only with difficulty after prolonged treatments, but leave better scars than those cases which heal spontaneously.

DELAFIELD, F., AND PRUDEN, T. M.: Textbook of pathology. New York, N. Y., 1919.

Page 287:

The following excerpts from this well-considered work emphasize some of the aspects of tuberculosis.

"If the infection with tubercle bacilli be extensive or if step by step the bacilli are distributed in the tissues about the primary seat of infection, considerable amounts of tuberculous tissue of one or another form may develop and pass into a condition of coagulation necrosis, so that at length large necrotic masses with a comparatively small amount of well-defined tuberculous tissue, either diffuse or in the form of granula, may alone remain to indicate the character of the old and slowly progressive local infection. This form of lesion is found in the diffuse cheesy infiltration of the lymph-nodes. These large areas of tuberculous inflammation are apt to be white or yellow in the central and necrotic portions, which are sometimes dense, compact and hard, sometimes soft and friable. These are not infrequently surrounded by an irregular gray zone of tubercular tissue or by a dense fibrous-tissue capsule."

Pages 551-553:

"Tuberculous inflammation may be local, confined to the nodes, or it may occur in connection with general acute miliary tuberculosis, or with tuberculous inflammation of the single organs. It may occur in single nodes, or in several nodes of the same group, or in groups situated in different parts of the body. In its simple and acute form there may be no change evident to the naked eye in the appearance of the nodes, or they may be besprinkled with small, grayish white, translucent spots. Under these conditions the nodes may be reddened and soft or swollen and denser than normal. In more advanced forms of the lesion, the tubercles coalesce and undergo a greater or less degree of cheesy degeneration. Under these conditions the cheesy areas are evident to the naked eye as more or less sharply circumscribed, opaque, whitish or yellowish areas, frequently surrounded by an irregular, translucent, grayish zone of tubercle tissue which merges insensibly into the adjacent tissue. The entire node may become involved, and more or less completely converted into a cheesy mass, in the periphery of which a zone of tubercle tissue may or may not be evident.

Microscopically the small nodules or miliary tubercles are seen to consist of more or less circumscribed collections of small spheroidal, or more frequently larger polyhedral, cells, with or without well-defined giant cells. They usually commence to form in the follicles and lymph-cords of the nodes, and these may spread and involve the entire surrounding tissue. The cheesy degeneration, which here as elsewhere is apt first to involve the central portions of the tubercles presents the usual appearance. Tubercle bacilli may be found in the edges of the cheesy areas or in the tuberculous tissue about them. Simple inflammatory changes regularly occur in the periphery of the tubercles. There is an increase of the cells in the lymph sinuses and follicles, and a more or less marked swelling, and apparently a proliferation of the cells of the particular tissue of the node. In cases in which the process is chronic, there is often a marked increase of the connective tissue of the nodes, the reticular tissue becomes dense

and fibrous, and the trabeculae and capsule are thickened. The tubercles themselves, instead of undergoing cheesy degeneration, may become fibrous or be converted into a hyaline material.

The cheesy material may dry and shrink and become enclosed by a capsule of dense connective tissue, and become calcified, or it may soften, and thus cavities be formed in the nodes, filled with grumous material, or inflammatory changes may be induced in the vicinity of the nodes, leading to abscesses. On the other hand, hyperplastic inflammation in the periphery of the affected nodes may result in their becoming bound together into a dense nodular mass."

Scrofula.—"Tuberculous inflammation of the lymph nodes, especially in those of the cervical and mesentery groups, often occurs in children, particularly in those who are ill-nourished. This general condition is known as scrofula, and the lesion of the nodes is sometimes called scrofulous inflammation.

While in many lesions the portal of entry of the tubercle bacilli is not evident, and the lesions often present the appearance of hyperplasia of the lymphoid tissue, with cheesy degeneration and the formation of more or less dense fibrous tissue, rather than the typical characters of tuberculous tissue, nevertheless miliary and other forms of tuberculous inflammation are often present in so-called scrofula, and tubercle bacilli, while sometimes absent, are often present and virulent.

The necrotic portions of such cheesy lymph-nodes in scrofula may soften and break down, by the establishment of purulent and necrotic inflammation about them, abscesses may form, which may open externally. These abscesses may heal, but usually the healing is difficult and slow, and long-continued suppurations, frequently with the development of fistulæ, are very common. Instead of softening, the cheesy material in the nodes may become dry and hard and it may also undergo calcification."

Page 553:

"*Generalized Tuberculous Lymphadenitis.*—Several cases have been recorded of extensive tuberculous hyperplasia in various parts of the body, the lesion resembling in its gross characters that of Hodgkin's Disease, while in some of these cases the morphology of the lesions is characteristic of tuberculosis; in others the new tissue is diffuse and consists largely of new-formed, small, spheroidal and polyhedral cells with large multinuclear cells and a fibrous tissue. The new-formed cells may undergo necrosis. Thus the tuberculous nature of the lesion is not always plain, even on microscopical examination. Animal inoculations are often necessary for the establishment of the nature of such cases."

Page 659:

"*Tuberculous Lymphangitis.*—Tuberculous inflammation occurs in both large and small lymph-vessels. Miliary tubercles and diffuse tubercle tissue may form in the walls and project into the lumen of the larger trunks, and in the smaller vessels the new growths may entirely fill the lumen, and grow within it, with more or less involvement of the walls. This may occur independently, but it is most frequently seen in connection with tuberculous inflammation of the adjacent tissues. Thus in the tuberculous lymph-nodes in the vicinity of the thoracic duct, there may be a direct extension of the tuberculous inflammation, and a growth of tubercle tissue into the lumen. In the vicinity of tuberculous ulcers in the intestines, furthermore, we often see the subserous lymph-vessels which pass from the vicinity of the ulcers, distended with the products of tuberculous inflammation and looking like dense white knobbed cords."

HURLEY, V.: Surgical Shock. *The Medical Journal of Australia,* April 10, 1920, i, No. 15, pp. 331-6.

The author bases his conclusions upon observations made during the recent war.

Shock may be defined as "that depressed activity of the bodily functions which frequently follows upon severe injury, either by wounds or in surgical operations, and also after hemorrhage from any cause". There is falling blood-pressure, with contracted arteries, a normal heart, and a normal vasomotor center, and deficiency in the volume of blood in circulation. This applies not only to cases of actual hemorrhage, but also to those where there is no reason to suppose that there has been any great loss of blood.

Etiological Theories. — The author mentions and disproves the etiological theories of shock, such as that it is due to: (1) exhaustion of the bulbar centers, and especially of the vasomotor center, (2) heart-failure, (3) acapnia (Henderson), (4) acidosis, (5) suprarenal exhaustion.

He considers the lowered blood-pressure the most important feature in shock. If the blood-pressure is restored and maintained the other symptoms disappear. In order that the body-tissues may carry out their functions it is vital that there should be: (1) An adequate supply of circulating blood; and (2) A sufficient blood-pressure.

By means of the blood the body-cells are kept supplied with oxygen; when this supply is reduced, even for an hour or two, harmful metabolic changes occur, and irreparable damage results. In man, lowered blood-pressure affects first the vasomotor center and later the respiratory center.

In addition to the lowered blood-pressure, there is also a diminished volume of blood circulating in the vascular system. It may be observed not only following hemorrhage from wounds, but also where none has occurred (the exemia of Cannon).

There is an increased hemoglobin and red corpuscle content of the blood in the capillaries, as compared with that in the veins. Instead of the normal difference of 3 per cent, there is often a difference of 30 per cent, showing that "there is a concentration of the blood in shock, as well as a diminution in volume, due to plasma escaping from the vessels, perhaps also by sweating". Malcolm has confirmed this percentage increase of red corpuscles in shock, and maintains that the arteries are constricted rather than dilated.

The loss of blood volume alone may not be serious, unless combined with other injurious factors. In experiments on cats it was found that the removal of one fourth of the blood was rarely followed by dangerous consequences, but that when this was combined with other factors also attended by some degree of fall in blood-pressure, such as cold, injury, etc., a much smaller loss of blood resulted in a permanent and serious fall of blood-pressure, attended by other signs of wound shock.

Contributing Causes.—The author discussed the following factors. (1) *Exposure to Cold.*—This is one of the most important factors in exaggerating wound shock. The effect of cold is to lower the blood-pressure, depress the vital functions and produce showing of the heart-beat.

(2) *Injury to the Tissues, Especially the Muscular Tissues.* The liability to shock seems to increase with the extent of the tissue injured, especially of the muscular tissue injured. Section of the spinal nerve above the origin of the nerves supplying the injured part, in experimental cases, had no effect, but clamping of the main artery and vein, or excision of injured tissue, resulted in improvement. This would indicate that some chemical product of tissue injury must be absorbed into the circulation from the injured tissues.

During the injury the blood-pressure falls and, if the fall is not very great, spontaneous recovery may occur. In severe cases the primary fall is usually followed by a slow secondary fall, ending in death. In either case a slight hemorrhage has the effect of enormously exaggerating the state of shock.

It is known that chemical substances are set free from almost any tissue as a result of injury, even of temporary stoppage of the circulation. Histamin, which powerfully dilates the capillaries, but not the arterioles, produces a condition of profound shock, if given in large doses.

(3) *Anesthetics.*—Surgical operations exaggerate the state of shock. It is very important that cyanosis should not be allowed to occur, as the body-tissues are then exposed to all the evil effects of diminished oxygen supply. Excess of carbon dioxid causes an initial rise of blood-pressure, but, a subsequent fall, with peripheral vasodilation. Defect of oxygen, even when there is no excess of carbon dioxid, is apt to leave behind a condition in which there is a progressive fall of blood-pressure.

"Holdane thought that administration of oxygen might be of value in shock. It is not so much that the arterial blood is insufficiently oxygenated, but that the blood is not supplied to the tissues with sufficient rapidity, owing to the low blood-pressure. A more effective treatment is to raise the blood volume by increasing the volume in circulation.

Henderson's suggestion of increasing the carbon dioxid in the air breathed is logical. But the amount of oxygen must not be decreased.

Treatment.—To raise the blood-pressure: (1) We may use drugs which constrict the arterioles, the peripheral resistance being thus increased; the same force of heart-beat as before produces a higher pressure.

(2) We may raise the pressure by increasing the volume of circulating blood without altering the peripheral resistance."

Any increase in blood-pressure resulting from the use of vasoconstrictor drugs, such as ergot, adrenalin, pituitrin, etc., the author considers, is more or less counteracted by the constriction of the arterioles of the organs affected. There is little object in causing the arteries to contract, in any case.

A better method is to increase the volume of circulating blood, "thus insuring a sufficient supply to the organs and especially to the cerebral centers. By intravenous injection of fluid in sufficient quantity the blood-pressure is raised, the fluid lost to the body by hemorrhages is restored, and also that lost to currency by stagnation in the capillaries."

Artificial fluids, such as saline solution, Ringer's solution, etc., have been found to be useless in restoring blood-pressure, and are often harmful.

The use of hypertonic solutions has also been recommended, but it has been found that the temporary rise in blood-pressure produced by this means lasts very little longer than that of Ringer's solution, as it is soon counteracted by water attracted from the tissues, and, of course, the diminished calloid concentration acts as before.

On the assumption that acidosis is a factor in causing shock, others have substituted alkaline solution, such as sodium bicarbonate (from 3 to 4 per cent) for saline solution. The low blood-pressure and deficient oxygen supply to the tissues in shock cause the "acidosis", and it is more rational to increase the oxygen by improving the circulation than by attempting to neutralize the acid once produced. "The 'acidosis' is innocuous, and may even be beneficial, in that the increased hydrogen-ion concentration of the blood may stimulate the respiratory center to increased activity, and so increase the supply of oxygen.

The question of the viscosity of the circulating fluid must also be considered. Ringer's solution and water, besides containing no colloid with an osmotic pressure, have a viscosity which is only one-third that of blood.

"Glycerin has sufficient viscosity, but is diffusible, and has a deleterious effect on the heart and corpuscles.

"Starch and agar are indiffusible, but have such large molecules that their osmotic pressure is practically nil.

"Foreign proteins affect the kidney and are excreted in the urine. There is also the question of anaphylaxis, especially as all wounded men have had antitetanic serum injections.

Gelatin (6 per cent) and gum (7 per cent) have the same osmotic pressure and the same viscosity as blood. The osmotic pressure of these colloids is not sufficiently high to prevent hemolysis of red corpuscles, so they must be dissolved in 0.9 per cent sodium chlorid. Gelatin has the disadvantage

that on sterilization it loses much of its viscosity and there is also the possibility of unkilled tetanus spores and the risk of intravascular clotting.

For the above reasons gum arabic was decided on. It is innocuous, non-hemolytic, and non-agglutinating and easily sterilized, without loss of viscosity."

"The method of preparing gum solution follows: The gum is dissolved over a water bath. If freshly distilled water is not available, tap water may be used without harm. The solution should be filtered through flannel or several layers of gauze. In earlier work a 3 per cent solution was used, but better results are obtained by using a 6 to 7 per cent solution, which is, as has already been stated of the same osmotic pressure and viscosity as blood. The technic of introduction is the same as for intravenous injection of saline solution. The solution is not allowed to run in at too rapid a rate; 600 c.c. in a quarter of an hour is a safe standard. As the amount of blood lost is uncertain, it is best to control the effect of injection by watching the blood-pressure. Half a litre may be given as a routine procedure and a similar quantity one-half to one hour later.

While Bayliss's gum solution is of great value, blood transfusion is much more effective and to be perferred wherever possible. The chief difficulty to its general application is that of obtaining suitable donors when needed.

There is every reason for believing that blood corpuscles administered in transfusion live and perform their usual functions in the blood of the recipient. Blood films taken at intervals after transfusion show no evidence of abnormal corpuscles. There is no evidence of free hemoglobin in the circulating blood, and no hemoglobinuria.

A prolonged low blood-pressure results in a loss of excitability of the bulbar centers, and if this has lasted very long no recovery is possible, even by blood transfusion. It is therefore evident that to be effective it must also be prompt.

Animal blood cannot be used for this purpose, as severe toxic symptoms are produced. Also the blood of a donor must be proved to be compatible with that of the proposed recipient before transfusion. Moss classified the blood of all individuals under four groups. The blood of a doner belonging to any one group may be safely given to another person of the same group, but not necessarily to one of another group. The incompatibility manifests itself in hemolysis and agglutination, and these two reactions run parallel, so that is necessary to test only for one or the other, the agglutination reaction being the most practical. The blood grouping may be shown as follows:

	Red Corpuscles				
Serum	*1*	*2*	*3*	*4*	*%*
1	—	—	—	—	8
2	+	—	+	—	40
3	+	+	—	—	10
4	+	+	+	—	42

+ = Agglutination.
— = No agglutination.

From the table it may be seen that corpuscles of Group 4 are compatible not only with the sera of their own group but with that of each of the other three groups. They may therefore be called "universal donors"; fortunately, they represent nearly one-half of all individuals.

"There are two possible methods of transferring blood from one individual to another—direct and indirect. In all methods of blood transfusion the difficulty to be overcome is clotting.

"In the direct method an artery of the donor is connected to the vein of the recipient, either directly or by means of fine rubber tubing, with a cannula at each end, as in the method of Fullerton and Bazett. The great objection to this method is that it is not possible to tell how much (if any) blood passes. There is the added objection that donor and recipient must be side by side and clotting is more liable to occur. The indirect methods have entirely superseded the direct.

"In the indirect methods the blood of the

donor is received in a vessel or a syringe in which steps have been taken to prevent clotting. A quantity which can be accurately measured, is transferred to the recipient.

"The two most commonly used are the paraffin and the citrate methods. Both are equally effective.

"*Paraffin Method.*—The blood of a previously tested donor is received into a glass flask which has been coated inside with an even layer of paraffin of a melting-point between 40° C. (104° F.) and 50° C. (122° F.). Great care must be taken in the cleaning and paraffining of the flasks. A tube of the Kimpton Brown type, with a capacity of 400 to 500 c.c. is the most useful, although when these were not available the large ampoules used as containers in the Carrell-Dakin treatment were readily improvised and proved very satisfactory. The vein (usually median basilic or cephalic) of the donor and recipient are exposed by open dissection under local anaesthesia. The vein is isolated with a minimum of dissection, cleared and ligatured. A V-shaped incision is made in the vein of the donor, distal to the point of ligature and the drawn out end of the glass flask inserted. The flow of blood into the flask may be assisted by producing a small negative pressure by means of a rubber bulb. When the required amount of blood (500 to 1,000 c.c. usually) has been withdrawn, the flask is removed, the vein of the donor tied distal to the opening and the blood is transfused into another v-shaped opening made in the vein of the recipient proximal to the ligature previously applied. The flow of blood into the vein of the recipient may be hastened by connecting the other end of the rubber bulb before mentioned, by which a slight positive pressure is developed in the flask.

"*Citrate Method.*—In this method (Robertson's) is required a large bottle with a well-fitting rubber cork, through which three tubes are led: (1) Conducting the blood from the donor to the bottle; (2) conducting blood from the bottle to the recipient; (3) connecting with a rubber bulb already described under the paraffin method and used for producing negative, or positive pressure in the bottle, as is required. It is essential that all parts of the apparatus be kept thoroughly cleaned and all cannulæ and tubing stored until required in sterile paraffin. Firstly, 160 c.c. of sterilized 3.8 per cent sodium citrate solution are placed in the bottle; into this the blood from the donor is received. While the blood is flowing the bottle is kept gently agitated. It is also kept warm by being immersed in a containing vessel holding water at a temperature of about 100° C. (212° F.).

"The citrate method has the following advantages over the paraffin method: (1) The donor and recipient need not be together, side by side in the operating room, as is the case in the paraffiin method. (2) The blood in the citrate method may be kept and safely used for some hours after it is withdrawn. I have used such blood as long as six hours after it was taken from the donor. No hemolysis of corpuscles occurred. Fears have been expressed that the amount of citrate thrown into the circulation may have a harmful effect, but no harmful effects have been observed."

In desperate cases of shock, blood transfusion combined with gas and oxygen anesthesia has rendered successful operation possible where it was absolutely impossible under any other method of anesthesia.

In conclusion, Bayliss summarizes the data on wound shock as follows: "Various causes in combination, some nervous, some chemical, each associated with a reduction of arterial pressure and all exaggerated by hemorrhage, result in a state of collapse, whose symptoms seem to be sufficiently accounted for by the effects of a more or less prolonged low blood-pressure. Along with hemorrhage, the most serious of these collateral causes is the absorption of toxic products from injured tissues, especially muscle. These products have a dilator effect on the capillaries, similar to histamin; blood is withdrawn from circulation and held up in the capillaries by stasis. The condition becomes progressively worse, unless the con-

tinued inflow of toxic products is prevented or counteracted. The injured parts should therefore be removed as soon as possible, operative treatment and resuscitation being undertaken at the earliest opportunity. The toxic products already absorbed may be eliminated or destroyed if blood-pressure and volume of blood in circulation be raised by appropriate intravenous injection. If, however, the low pressure has lasted for some time, the nerve centers become paralyzed and structural changes are evident.

Tyaw, E. S.: Acute Lymphatic Leukemia with Report of a Case. *China Medical Journal,* Jan., 1920, xxxiv, No. 1, pp. 37-40.

In view of the rarity of the condition described in this article, the author reports the following case of acute lymphatic leukemia.

The patient was a boy aged fifteen years. At the time of admission to the hospital the illness had lasted about six weeks. It began with enlargement of the lymph glands on the right side of the neck, without pain or fever. In the course of a week the glands on the left side also began to swell. Then followed the involvement of the axillary gland, the inguinal glands, etc. He had a chronic cough and at the time of admittance to the hospital he coughed more than usual; the expectoration in the morning was at times tinged with blood. No night sweats. Owing to the presence of adenoids, he suffered much from difficult breathing. His appetite was good, but he did not assimulate his food very well. His strength and weight steadily decreased.

Physical Examination.—General pallor with flushed cheeks. Abdomen large with a few purpuric patches. Hypertrophic rhinitis of right nostril with adenoids in rear. Palate showing hemorrhagic patches; pharynx congested. Tonsils much enlarged with dilated veins coursing over the surface. Cervical glands on both sides of neck extensively enlarged, firm but painless and loosely joined in groups which were freely movable under the skin. Chest flat and expansion poor. Posteriorly, dulness at the apex of right lung, with prolonged expiration and increased vocal fremitus but no rales. Heart action rapid with soft systolic murmur. Abdomen soft and distended.

Liver enlarged downward only, about three finger-breadths below the costal margin. Spleen enlarged and palpable about three finger breadths below costal border. Inguinal and epitrochlear glands enlarged. The glands in the popliteal spaces were found enlarged about five days after admission. Patient's weight was 75 pounds. Pulse 105. Temperature normal. Blood-pressure: systolic 115; diastolis 75.

Laboratory examination showed no tubercle bacilli in sputum. Urine and feces negared count 4,500,000; and the white count was 45,500.

The glands increased not only in size but also in number, the disease taking a downward course very rapidly. On February 14, three days after admission, clusters of enlarged glands appeared below the nipples. One of these glands was removed and sent to the laboratory. The gland was found to consist of uniform masses of small lymphoid cells with extravasation of erythrocytes toward the capsule.

As the patient's condition became rapidly worse under treatment with arsenic and calcium lactate, it was decided to try roentgen rays which were applied over the spleen once every three days. As no improvement was evident after four exposures, roentgen rays were next applied to the enlarged glands of the neck instead of to the spleen. On March 14, the anemia was more marked; there was edema of the legs. The heart's action was more rapid. The white count suddenly rose to 115,000. On March 18, the anemia had perceptibly increased and there was dyspnea. There now occurred a severe attack of epistaxis and the patient succumbed at midnight.

Autopsy was not obtainable, but the clinical picture, the blood examination and the

rapid course of the disease warrant the diagnosis of acute lymphatic leukemia.

OSLER AND MCCRAE: Primary Splenomegaly with Anemia (Splenic Anemia, Banti's Disease). *The Principles and Practice of Medicine,* 1920, 882.

Definition.—A primary disease of the spleen of unknown origin, characterized by progressive enlargement, attacks of anemia, a tendency to hemorrhage, and in some cases a secondary cirrhosis of the liver, with jaundice and ascites. That the spleen itself is the seat of the disease is shown by the fact that complete recovery follows its removal.

History.—The name "splenic anemia" was applied to a group of cases by Greisinger in 1866. H. C. Wood, 1871, described cases as the splenic form of pseudoleukemia. The real study of the disease was initiated by Banti, in 1883. In France the condition was called "Primitive Splenomegaly," and many different types have been described. Here we shall deal only with the form referred to in the definition as splenic anemia and Banti's disease.

Etiology.—In the majority of cases the enlargement of the spleen comes without any recognizable cause. In a few cases malaria has been present, but in the greater number the first indication has been the mechanical inconvenience of the big spleen. Males are more frequently attacked than females. It is a disease of young and middle life, the majority of cases occurring before the fortieth year. Some hold that syphilis is important in the etiology. It is also met with in young children. Some of the cases of infantile splenic anemia of von Jaksch and the Italian writers belong to this disease.

Under diagnosis the authors describe briefly a series of forms which differ essentially from splenic anemia. These are:

(1) Splenomegaly with alcholuric hemolytic jaundice. (Usually familial).

(2) Splenomegaly of the Gaucher type (primary endothilioma).

(3) Splenomegaly with primary pylethrombosis. (Resembles Banti's diagnosis,—can only be made postmortem).

(4) Hepatic splenomegaly (three varieties):

(*a*) Alcoholic cirrhosis.

(*b*) Syphilitic cirrhosis.

(*c*) Cases in which the spleen becomes enlarged in connection with hypertrophic cirrhosis of the liver or with hemochromatosis.

(5) Splenomegaly in pernicious anemit. (Diagnosis made by blood findings).

(6) Tropical splenomegaly (kala-azar).

Treatment.—There is only one means of radical cure,—removal of the spleen. This should be done early. If severe anemia exists this should first be treated until blood condition is improved. When marked hepatic changes have occurred, operation is usually contraindicated. Cases too far advanced for operation should be treated like any severe anemia. If there is cirrhosis of the liver and ascites the usual measures are to be taken. If syphilis exists, active treatment for that is recommended.

BOORSTEIN, S. W.: Postdiphtheritic Paralysis. *Journal of the American Medical Association,* Feb. 21, 1920, lxxiv, 512-513.

Diphtheritic paralysis occurs usually in the second or third week after the illness. The frequency of its occurrence after the injection of antitoxin is hard to state, while without antitoxin it occurs in about 5 to 15 per cent of the cases.

A distinction may be made between a localized and a general paralysis. If localized, the soft palate is usually involved. The palate alone may be involved, or the muscles of the pharynx and larynx may also be paralyzed as well as the ocular muscles. Paralysis of the pharyngeal muscles causes trouble in swallowing. In the generalized form, the extremities are next affected. In severe cases there may also be involvement of the muscles of the trunk and neck, and sometimes of the diaphragm.

Duration of the affection depends upon its severity and extent. A patient may recover from a slight localized paralysis in a few weeks. The severer form lasts for many months, even for a whole year. Recovery is as a rule to be expected, though often it is much delayed and frequently leaves deformities. The deglutition paralysis is quite serious. Respiratory paralysis, myocarditis and nephritis are complications.

In regard to *treatment,* strengthening the diet is an important factor of this condition; hence, the patient should be fed by a stomach tube if he is not able to eat. The injection of serum is of doubtful benefit. Absolute rest in bed is important, and early contractures should be prevented. Massage and exercise are urgently recommended.

Two cases are reported by the writer which are of the severe type. In the first case, after noting the interference with the pharyngeal muscles and fearing the stretching of the paralyzed neck muscles, Boorstein decided to apply a felt collar to support the neck. He made a collar from thick felt, one and one-half inches in thickness and rather solid, and applied it in the vertical position. The collar was put on, encircling the neck, and the ends were sewed together. The child began to breathe better immediately. In a week a spinal brace was applied, the collar left on, and massage ordered. Later on, exercises were added. In one and one-half months the child made a perfect recovery. In the second case the writer, remembering the benefit derived from the felt collar, applied a similar one with success. As both upper and lower extremities were paralyzed, plaster cases were applied to the feet at the same time. In this case the child also began to improve immediately. The width of the collar used corresponded to the distance between the chin and the sternum when the head was slightly hyperextended. The second case was entirely cured in two months. The writer feels that although children with diphtheritic paralysis recover, the very rapid recovery noted in these two cases is undoubtedly due to the orthopedic methods employed.

Jex-Blake, A. J.: Bronchiectasis. *British Medical Journal,* 1920, i, 591.

The subject is thoroughly discussed with regard to frequency, pathological anatomy, pathogenesis, symptoms and signs, complications, course and duration, diagnosis, and treatment—both medical and surgical,—with statistics covering the various topics.

Medical Treatment.—In all cases inversion of the patient, or letting him cough with his head and chest hanging downward to facilitate emptying the bronchiectatic cavities, is a valuable practice and should be carried out on waking. The medical treatment aims at combatting infection in the bronchial tubes by antiseptics; the most widely used is creosote. It may be administered in three ways:

(1) By mouth in capsule form, although this method tends to upset the stomach.

(2) By intrabronchial injection—creosote, thymol, menthol, or some such organic antiseptic, may be dissolved in five or ten parts of olive oil and injected into the trachea below the vocal cords through the curved nozzle of a syringe, after cocainization of the pharynx and larynx. It is not highly successful.

(3) By inhalation, this method gives successful results of a palliative nature up to a certain point. The creosote, mixed perhaps with equal parts of eucalyptus oil and oleum pini silvesbris, may be given on a Burney Yeo inhaler, worn for many hours a day. Another method is to have a small closed creosote chamber where the creosote can be volatilized. In this, with his eyes properly protected, the patient can inhale the fumes. The coughing induced empties the dilated tubes. The antiseptic action of the creosote on their walls is beneficial. A creosote vapor bath is also suggested, at first for five minutes a day, increasing to twenty minutes. Improvement in the patient's general condition results, loss of fever, improvement in appetite, reduction in the quantity of sputum, etc. The treatment is, however, only palliative. The author suggests the possibility of inhalation of a 2 per cent solu-

tion per day. Dakin's chloramin, sprayed into the air by a steam atomizer. This was successful in the sterilization of the nasopharynx of carriers of the meningococcus.

DAVIS, I. J.: Bronchiectasis: Memoranda. *British Medical Journal,* 1920, i, 767.

The author comments favorably on the article of Dr. Jex-Blake (*Brit. Med. Jour.,* 1920, i, 591), quotes cases, and further suggests frequent use of mouth-washes, and of nasal antiseptic fluids in suitable cases.

ZUEBLIN, E.: Results of Ether Anesthesia on Suspected and Manifest Cases of Pulmonary Tuberculosis. *American Journal of Surgery, Anesthesia Supplement,* April, 1920, pp. 44-46.

After enumerating the dangers and inconveniences of ether application in the class of patients designed as suspected and manifest cases of pulmonary tuberculosis, the author declares that he would discard the use of ether entirely. He is well aware that there are certain cases in which we cannot get along without the use of ether. On the other hand, however, he would urge that no ether nor chloroform anesthesia be given without any preceding reliable chest examination, and that the anesthesia be cut as short as possible. The administration of an anesthetic has developed into such an art the the specialist will be able to adopt a clever method of removing and lessening pain without adding an undesirable injury to the patient's existence by allowing a dormant tuberculous focus to become active again, and thereby undermining the results of a skillful surgeon.

LISTER, T. D.: Medical Problems of Life Assurance. *Lancet,* April 17, 1920, pp. 892-893.

Those who have duties in relation to accident and disease insurance have many questions to answer before giving an opinion on a case. The medical considerations are essential, but one must pass judgment on the relative importance and interrelation of the medical and the other facts. Heredity alone opens up a number of problems that are by no means settled. Very little is known about heredity, but impressions are harboured, derived chiefly from one's own experience. The biological evolution of disease, a matter of great interest for the insurance companies, has as yet not received enough attention. The endocrine secretions bear a close relation to this study. One's difficulties as an insurance adviser may become complicated by inquiries as to the health of the functions of many glands which are at present ignored, and one may be asked to ascertain whether the proposed regularly consumes a ration of some particular gland.

The insurance of cases of enlarged thyroid, whether attended with the symptoms of Graves's disease or not, is a not infrequent problem. Not much is known about the mortality in this connection, but we know that the outlook is not very bad, and that the majority of such cases are acceptable. But more information from those who have large experience of these cases would be helpful.

In certain families death tends to occur from asthma, bronchitis, pneumonia, phthisis, and so forth; in others from arteriosclerosis, aneurysm, fatty heart, syncope. What is the relation of such conditions to infections, notably hereditary and acquired syphilis in the latter group, or to gout, or to excessively strenuous living?

There are opportunities for a great extension in our work in investigation, perhaps with actuarial assistance, of all these problems.

DEARMAN, W. A.: Indicanuria (Toxic States), Symptoms, Diagnosis and Treatment. *Southern Medical Journal,* April, 1920, xiii, 232.

The paucity of discussions on indicanuria in textbooks and current medical literature

has led Dearman to prepare and read this paper before the Southern Medical Association at its meeting in Ashville in November, 1919.

He defines indicanuria as a "protein decomposition in the intestinal canal and the liberation of a very violent toxin which is absorbed and gives rise to a more or less symptom complex."

In a study of 50 selected cases the principal symptoms were as follows: lanquor, lassitude, fatigue, pain in back of neck (cardinal sign), predominating down the spinal column (cardinal sign), vertigo, headache (continuous or intermittent), dyspnea on exertion, insomnia, anorexia, sensitiveness to cold, vaso-motor disturbances (cold, clammy skin), amblyopia and other ocular disturbances, chilliness, acute and continuous febrile movements, loss of weight, no capacity for work, nausea and vomiting, marked depression, train of nervous symptoms, anxious state, hypotension (usually the rule), leukopenia and in most of the cases muscular soreness.

Dearman considers the following to be etiological factors of indicanuria: Any condition altering the epithelium of the intestine, such as chronic amebic dysentery, vegetative cystic gall-bladder drainage and altered pancreatic function associated with gastro-duodenitis. Hypoacidity is responsible in many cases as much as focal infections in producing a toxin which inhibits the normal peristaltic wave. In some cases, the author found the condition to be due to excessive purgation, excessive protein intake, overwork and lack of diversion and recreation.

According to the author, there is unquestionably a type of intestinal toxemia which might be called "indicanuria sine indicanuria" and it is quite possible for protein decomposition to begin without any assignable cause aside from a simple primary extensive protein breakdown due to bacterial activity (putrefactive bacteria). The formation of toxins seems to take place in the lower part of the small intestine and colon and the remote effects of these toxic states on the myocardium, arteries, kidneys, liver and other viscera, cannot be overstimated. Constipation, per se, does not seem to be a cause of indicanuria.

The nervous symptoms, due to the absorption of putrid protein products are the most predominant features in the clinical picture of the disease.

Indicanuria and other toxic states are not always confined to adult life. The same situation obtains in children to a surprisingly large degree, and the symptomatology that marks the clinical progress of the case is apt to be overlooked unless a thorough examination of the urine is made, especially for indican.

The diagnosis of indicanuria depends upon the recognition of a symptom complex as well as a few outstanding cardinal or specific symptoms which are as a rule always present and associated with the condition coupled with a thorough examination of the urine, and in this examination a test for indican must never be omitted. Inquiry should always be made prior to the urine examination if a purgative has been taken the day before, as this will usually sweep out of the gastrointestinal tract most of the putrefying protein material and give a negative reaction.

There are several tests for indican in the urine. The one that the author has employed and found satisfactory is as follows: "In a clean test tube are placed equal quantities of pure hydrochloric acid and urine which are thoroughly mixed by inverting the tube several times. Next a few drops of Babarque's solution are added, and the tube is again well shaken. Next add a small quantity of chloroform and again mix well, set aside for a few minutes, and the chloroform will settle to the bottom of the tube and carry down with it the indigo blue color which marks the end reaction of the indican test."

The urine in severe intestinal toxemia is as a rule highly colored, dark amber. However, this should not deter one in making an investigation even in a specimen of perfectly clear urine, as surprising results are like-

ly to be observed after the completion of the test.

The treatment of simple indicanuria is mainly dietetic. Primarily the gastrointestinal tract should be cleared of all putrefying protein material by the initial administration of a purgative, and the most suitable in Dearman's hands has been calomel, grains iii, phenolphthalein, and powdered rhubarb aa grains vi., made into three capsules, and given every two hours commencing usually late in the afternoon.

The patient should be given a written diet list of the following: clear soups, vegetable broths, puree of corn, beans, peas, asparagus, spinach, celery, onions, potatoes and tomatoes. No eggs, fish, shrimp, oysters, crabs or lobsters; no meat, game or poultry; no cheese, ice cream or milk. The patient may take farinaceous foods, such as oatmeal, rice, sago, hominy grits, cracked wheat, whole wheat bread or biscuits, corn, rye, and Graham bread, rolls, dry and buttered toast, crackers, muffins, waffles, pancakes, wafers, grape nuts, macaroni, noodles and spaghetti. Vegetables such as potatoes (sweet or Irish) any style, green peas, string beans, beets, carrots, celery, spinach, artichokes, alligator pears, eggplants, lettuce and onions. All vegetables except cabbage, cauliflower and turnips. Desserts: rice and sago with a little cream and sugar, figs, raisins, nuts, syrups, jams, and jellies; marmalades and gelatin, prunes, apples, and pears either cooked or raw. Drinks: tea and coffee (with cream but not milk) grape juice, orangeade and limeade, lemonade and Vichy. An abundance of pure water, cold or hot, and cocoa. Not allowed to take veal, pork, steak, goose, duck; salted, dry, potted or preserved fish or meat (except crisp bacon) oysters, crabs, salmon, lobster, shrimp, mackerel, eggs, turtle and ox-tail soup, gumbo, patties, mushrooms, mince pie, cabbage, cauliflower, turnips or cheese.

In addition to the above diet, the patient is given Bulgaria bacilli in some form, and the author usually prescribes a preparation known as Cultol which consists of Bulgaria bacilli incorporated in refined mineral oil. It is pinkish in color and has the consistency of jelly. The bacilli seem to multiply in this medium and the mineral oil overcomes the constipation. If the patient is not constipated, Bulgaria tablets may be substituted. Either preparation is administered one half to one hour before meals. The addition of a teaspoonful of sugar of milk to the dissolved tablets enhances their therapeutic effect. The author cautions to excessive care in prescribing Bulgaria tablets, as it has been shown in former times that some have been found to be nonviable.

The general habits of the individual should be gone into, and rest, sleep and proper recreation advised. When hypotension and general weakness are prominent features, tincture of nuxvomica in large doses, twenty to thirty minims are given t. i. d. after meals.

After two or three weeks, if the patient is indican free, a more liberal diet list can be prescribed, which will consist of more proteins but in a limited quantity. Light broths and oyster broth with boiled fish, the soft part of raw oysters, tender lean mutton, lamb, chicken, brains and sweetbreads (all sparingly) may be added to the diet.

Burrows, W. F., and Burrows, E. C.: Intestinal Toxemia. Its Medical and Surgical Treatment. *Medical Record,* New York, March 6, 1920, xcvii, No. 10, pp. 398-401.

The chronicity of intestinal toxemia is due to persistence of a mechanical or inflammatory lesion in the terminal oleum, colon, or rectum, the consequence of which is a local catarrhal process and interference with complete evacuation of intestinal contents. The latter are more liquefied than normal and their consistency as they pass the ileoceal valve is not adapted to efficient propulsion through the bowel. The intestine contracting upon this semifluid mass squeezes some forward and a good part of it backward, leaving residues, where none should exist, throughout the colon and rectum.

The *x*-ray is the method of choice for in-

vestigating the function of the ileum, colon and rectum, while the proctoscopic and digital examination of the rectum and anus are of equal importance.

The proctoscope will show a residue in sigmoid and rectum, excessive moisture of the rectal mucosa, pasty, light-colored, sour-smelling bowel contents which cling to the rectal wall, whereas in health the rectum after evacuation is practically free of fecal particles.

The authors distinguish clinically between two types of disorder,—a digestive and a nervous.

In the digestive type the predominant features are the general or localized abdominal tenderness and pains. The sigmoidal and cecal regions are sensitive and appendicitis or colitis may be simulated. The characteristic symptoms are sick headache, biliousness, gastric distress, heartburn, pylorospasm, eructations of gas, abdominal distention, foul or sour stools, diarrhea or soft evacuations alternating with periods of constipation, and later the symptoms associated with inflammatory lesions of the alimentary tract, gastric ulcer, appendicitis, gall-stones, ulcerative colitis. Nutrition suffers, anorexia replacing the usual ravenous appetite of intestinal toxemia; weight may be lost, and lassitude occurs. The complexion is sallow, the eyes heavy, joint and muscular pains are present, and disturbances of menstruation and kidney function are common. With loss of fat and stretching of ligamentous supports, the uterus, intraabdominal viscera, the kidneys are displaced and nerve reflexes, seen in the nervous type of the affection, result.

With the nervous type of intestinal toxemia abdominal tenderness is frequent especially over the sympathetic plexuses. The symptoms are fatigue, circulatory disturbances and flushes, irritability and mental depression, neuralgia, indefinite general pains and backache, and digestive symptoms are always present to some extent. The *x*-ray shows a much less marked stasis in the ileocecal region and there is no leakage through the cecal valve, while indicanuria is diminished or absent. The sigmoid, and frequently the colon, is generally elongated and prolapsed. Constipation is the rule.

In the treatment of intestinal toxemia outdoor exercises and occupations, and the elimination of worry aid in the reestablishment of normal functions. Proper food reduces intestinal putrefaction and aid in bowel regulation. Food, in the absence of stomach complications, should be liberal in amount and often both nutriment and fluids are forced. Alcoholic beverages are of value in many cases of intestinal toxemia. Water drinking with meals, stomach atony and ptosis being absent, is advantageous, as is also sweet milk with cream and boiled milk. Buttermilk and the fermented milks are often advocated for periods of two or three weeks at a time. Meat is desirable but at intervals the diet should be free of both meat and fish.

Direct treatment consists in:

(1) Acceleration of the passage of the bowel contents and the complete evacuation of bowel segments and rectum.

(2) Treatment of the catarrhal process.

(3) Operative elimination of (a) inflammatory areas in the intestinal tract, and (b) obstructive lesions.

Purgatives temporarily relieve, but later increase the symptoms since they injure the intestinal mucosa, increase secretion and the absorption of toxins. Salts are very harmful and always increase the catarrhal process. A vegetable cathartic pill given with the evening meal, gradually reduced in amount, and continued over a period of weeks to obtain one or two formed evacuations in the morning is frequently indicated, but soft bowel movements or irregular evacuations during the day are indications that the bowel is functioning improperly. Enemata irritate the colon. Colonic washings, widely advertised are pernicious, as are also suppositories and other rectal irritants.

Simple enteritis and colitis are best treated by means of bland substances such as bismuth, barium sulphate, and chalk, injected into the bowel, using olive oil, cotton-

seed oil, or castor oil as vehicles. Medication is injected through a proctoscope, into the sigmoid flexure, thus avoiding rectal distention, and is spread throughout the colon and cecum by retroperistalsis.

Ipecac, bismuth subcarbonate, subgallate, or salicylate, sodium salicylate, salol, and the tannate preparations are useful in controlling bowel consistency and putrefaction, and castor oil and paregoric are indicated at times. Preparation of the Bulgarian bacillus and buttermilk, used for short periods at a time tend to change the character of the bowel bacterial content. The same is true of yeast. Mixed vaccines of the colon and typhoid types are useful, given in less than immunizing dosage. Organic glandular substances such as thyroid, thymus, and ovarian extracts are useless.

The abdomen is kept warm and from time to time an intense skin congestion, which is associated with a beneficial reflex circulatory reaction of the intra-abdominal organs, is obtained through means of a thermo or actinic ray lamp. If the *x*-ray shows a ptosed or atonic stomach, or in cases of severe intestinal toxemia with low blood-pressure, a proper fitting abdominal belt may be ordered.

Few operations are indicated. Marked inflammatory or obstructive lesions are, however, definite indications for surgical intervention. The appendix, frequently involved in intestinal catarrh and the common source of reflex gastric hyperacidity and functional disturbance, is always removed provided an abdominal operation is performed, and the writers consider it diseased if a bismuth residue is shown by the *x*-ray in the ileo cecal region at the end of seventy-two or even forty-eight hours, provided the rest of the colon is empty. Adhesions, intestinal bands and kinks are sources of reflex irritation and spastic constipation and should be eliminated. Denuded peritoneal surfaces should be swabbed with sterile mineral oil. Ptosis of the sigmoid flexure is occasionally an indication for sigmoidopexy, but operations upon the stomach, liver, or kidneys to remedy displacement are seldom indicated. Gastroenterostomy in never indicated unless there is an inflammatory or cicitrical obstruction of the stomach outlet, and the worst cases of intestinal toxemia seen in consultation are cases that have undergone such operation, the sort circuiting of the intestines or the partial excision of the colon.

Rectal and anal inflammatory or obstructive lesions are indications for operation. Complete bowel evacuations are the secret of health, and experience shows that if all back pressure upon the lower bowel is eliminated, through the surgical correction of lesions in the terminal bowel segment, restoration of intestinal functions frequently follows the medicinal treatment of intestinal toxemia.

Hemorrhoids act as both mechanical and irritative lesions. In their removal it is important to draw down any relaxed mucosa and excise with the hemorrhoidal mass. The author's operation of "Snare and Bullet" or the "Clamp and Suture" should usually be done under local anesthesis. With hypertrophy of the anal sphincters the superficial fibers of the muscles are divided. The writers have used division in preference to divulsion in over 100 cases of rectal disease.

Sloan, E. P.: The Tubercular Goiter Patient. *Illinois Medical Journal*, August, 1920, xxxviii, 144.

According to Sloan goiter and tuberculosis in their early stages affect the system in nearly the same way. So similar are their manifestations in the early stages that the differentiation is very difficult. When a patient is burdened with both of these conditions, if the goiter is removed the tuberculosis should be overcome.

In the last five years he has operated on 94 cases that he thought were tubercular before operation and every one has gained in weight and seems to have improved satisfactorily. He concludes, therefore, that pulmonary tuberculosis is not a contraindication for the removal of an active goiter with local anesthesia.

BEAVEN, P. W.: Pneumococcus Peritonitis in Infancy and Early Childhood. *American Journal of Diseases of Children,* Oct., 1920, xx, No. 4, p. 341.

Pneumococcus peritonitis is rather rare among infants and young children. During the last thirteen years, of 171 cases of general peritonitis treated in the Babies' Hospital, 9 have been bacteriologically proved to be of pneumococcus origin.

The pathology of peritoneal inflammation is a purulent fibrinoplastic exudate involving the whole peritoneal cavity. If the patient lives, adhesions form in the exudate which limit the process, finally causing localized abscess. In this it differs from other forms of purulent peritonitis seen in children. The infection is carried by the bloodstream. Opinions differ as to whether the primary source of infection is in the lungs, middle ear, or intestines. The author holds that the lungs are most frequently the focus of infection. In the case of apparently idiopathic peritonitis it may be that the pneumococci enter through the respiratory tract and are passed on in the blood without localizing in the lungs. In the author's cases two types of disease were observed: (1) those clearly secondary to pneumonia or empyema, and (2) those which are apparently primary.

In 3 of the cases the disease was secondary to a pulmonary involvement, but showed no clinical evidence of peritoneal inflammation. In these cases all, or nearly all of the serous membranes were infected. This widespread pneumococcus infection is peculiar to early childhood.

In 4 cases the peritonitis was secondary to a pulmonary involvement and showed definite peritoneal symptoms.

These 7 cases illustrate the usual course of secondary pneumococcus peritonitis. In no case was the onset of the peritonitis marked by definite abdominal symptoms, such as tenderness, rigidity, pain or vomiting. This peritonitis begins in a general inflammation, which becomes localized by the formation of adhesions. While this is taking place there is usually moderate fever, enlargement of the abdomen, and occasional vomiting. Palpation of the abdomen reveals masses.

In diagnosis, tuberculous peritonitis must be excluded by means of the tuberculin skin reaction. The rapid progress of the disease differentiaties it from the tuberculous type. In pneumococcus peritonitis the patients rarely die from that disease, but from associated conditions.

The treatment should be expectant until an abscess has formed. At that time incision and drainage of the abscess is indicated.

So-called *idiopathic* or *primary pneumococcus peritonitis* is usually fatal. The abrupt and stormy onset of this type differentiates it from the similar peritonitis of streptococcus origin. Acute appendicitis may simulate primary pneumococcus peritonitis, but in this disease the symptoms are not as acute. In appendicitis the temperature is usually lower, and well marked localized tenderness is present.

Opinions differ as to treatment. Most writers favor operation. In the author's cases nothing seems to have been gained by opening the abdomen. These, as well as cases of the other two groups, early tend to form a localized abscess, and apparently operation is useless until the localization has taken place. "The best treatment would seem to be to keep the patient under the influence of morphin, and by this method to keep the intestines at rest and provide stimulation to the child. If the vomiting is severe, hypodermoclysis is indicated."

FUSSELL, W. H., AND WOLFERTH, C. C.: A Case Exhibiting Slow Auriculoventricular Rhythm and Paroxysmal Tachycardia with Unusual Ability to Interrupt the Fast Rate. *Archives Internal Medicine,* 1920, xxvi, 192-204.

Report of a case with a history of attacks of paroxysmal tachycardia over a period of forty years; an ability to interrupt the fast rate with temporary cessation of cardiac activity; periods of slow rhythm with inter-

spersed runs of about the normal rate; abundant clinical evidence of myocardial disease and decompensation.

Electrocardiographic tracings showed left ventricular preponderance, depressed conductivity, periods of sinus rhythm alternating with auriculoventricular rhythm, and paroxysmal auricular tachycardia.

Observations were made regarding the alternations of the pacemaker between the sinus and auriculoventricular nodes, variations in rate, relations of auricular systole to ventricular systole. The significance of these phenomena is discussed.

The paroxysmal tachycardia was determined as auricular in origin by analysis of curves of offset and onset. The method by which the patient obtained interruption of the tachycardia is described, and an attempt made to evaluate the factors responsible for the behavior of the heart during the period of interruption.

Schneider, C.: Fatal Post-operative Pulmonary Thrombosis. *Annals of Surgery,* 1920, lxxii, No. 1, p. 91.

Causation compiled from other authors: (1) Local infection; (2) anemia; (3) slowing of blood stream; (4) subnormal general physical condition; (5) cachexia; (6) microörganisms in the blood; (7) excess of white blood-cells; (8) inefficient hemostasis; (9) traumatization of tissues with retractors, etc.; (10) injury to veins of extremities due, to badly arranged operating table; (11) injury to intima of veins; (12) excess of calcium salts in the blood.

Virchow first showed the relation between thrombi and emboli, pointing out that emboli not infrequently have their origin in the softening, breaking down, and detachment of venous thrombi. He stated that in embolism the plug consists, not of blood clots, but of so-called vegetation or concretion of fibrin which has been washed off from the valves of the heart or from the endocardium and carried forward by the arterial currents until the vessels become too small in caliber to allow it to advance any further.

Cohnheim and Litten experimentally demonstrated the fact that the arterial ramifications of the pulmonary artery do not anastamose. They are end-arteries. Pulmonary infarcts do not result in the death of the lung, when death of the animal itself does not result, but prevent the functioning in the infarcted area for purposes of oxidation.

The bigger the obstructed artery or the larger the number of smaller obstructed arteries, the greater is the effect upon respiration; and so it happens that where multiple emboli occur successively, even without parenchymatous changes in the lungs, death must eventually ensue from respiratory insufficiency.

Hamburger, W. W.: Clinical and Electrocardiographic Observations on Inversion and Other Anomalies of the P-wave. *Archives of Internal Medicine,* 1920, xxv, 232-243.

(1) Eighteen cases of inversion of the P-wave (migration of the pacemaker) are reported; twelve cases with normal rhythm; six cases with arhythmia (auricular extra systoles).

(2) Inversion of P-wave is most frequent in Lead III; five cases showed inversion in Leads II and III; one case in Leads I, II and III; five cases showed a diphasic P; four cases showed a bifurcated P.

(3) Analysis of these cases shows that the majority of the patients suffer with varying degrees of myocardial insufficiency and have associated acute or chronic infectious processes. Evidence of vagal influence is frequent.

(4) Inversion of P-wave with auricular extra-systoles should probably be interpreted as evidence of auricular pathology; without extra-systoles, is probably due to variations in vagus control.

(5) Electrocardiographic study of cases showing inverted P, or of cases in suspected vagotonic individuals should include the effect of (*a*) deep breathing, (*b*) change of posture, (*c*) atropin and (*d*) the effort test.

Sicard: Myoclonic Encephalitis. *La Présse Médicale*, April 14, 1920, xxviii, p. 22; reported in *Medical Record*, May 15, 1920, xcvii, 835.

Sicard reports 5 cases in which after a week or ten days, myoclonus appeared, often generalized, and often most marked in the abdominodiaphragmatic region.

The Medical Record report continues with a report of the American Red Cross work on encephalitis in Vienna. It states that the beginning headache and insomnia is soon followed by clonic muscular contraction of the limbs, face and abdomen.

Barrie, G.: Multiple Hemorrhagic Foci in Bone (Chronic Hemorrhagic Osteomyelitis). *Annals of Surgery*, May, 1920, lxxi, 581-593.

There are several cases reported by Barrie from the literature. He also reports a rare and interesting case from the New York Hospital for Ruptured and Crippled. The exploratory operation performed upon the lesions his patient presented, disclosed a highly vascular structure, presenting the gross appearance of healthy granulation tissue. The mass completely filled the destroyed areas of bone. This picture is typical of a regenerative effort in its reaction to injury. What Barrie wishes to particularly emphasize here is the well-established view expressed in modern pathologic studies, that inflammation is a reaction to injury, evidenced by attempts at repair. A primary effort at regeneration and reconstruction in all connective tissue proceses always has for its beginning the formation of granulation tissue. Such a process in bone is very properly termed an osteomyelitis even though there is no evidence presented of pus or pus formation. The view that the formation of granulations in any lesion or lesions is confirmative of an attempted repair seems beyond dispute. Barrie was able to show definitely in this case of multiple lesions and in numerous instances where complete studies of the solitary inflammatory process has been made, that they exactly simulate and conform to all the criteria presented governing a diagnosis of granulation tissue structure. All available evidence points to the conclusion that these pathologic conditions are the result of and follow bone destruction. The known etiologic factors bringing about bone destruction and producing the various forms of osteomyelitis are the spirochaeta, tubercle bacillus, infectious bacteria and parasites, traumata, malnutrition, and metabolic change, apparently due to endocrinal glandular lack of balance.

The feeling of the writer at the present time regarding therapeutic measures in cases exhibiting the multiple processes is that where lesions are accessible for curetting, such should be performed; where inaccessible to surgical procedure, radium may be tried, or Coley's toxins used. Perhaps more important than anything else in the treatment of cases of bone disturbance of this character will be methods having for their object the restoration of *nutritional lime—salt equilibrium.* These bone conditions are exceedingly chronic and insidious in their onset; that they, in fact, shorten life, does not seem to have been demonstrated.

Carr, J. C.: Bronchiectasis with Pulmonary Hemorrhage. *Medical Clinicals of North America*, 1920, iii, 1601.

Case Report.—Full discussion of symptoms: diagnosis of bronchiectasis with subsequent bronchopneumonia, finally fibrinous pleurisy. After pulmonary hemorrhages, the lung was collapsed by the injection of 700 c. c. of nitrogen. On the following day 12 c. c. of whole blood were injected subcutaneously. Hemorrhages continued. Three days later 750 c. c. of nitrogen were injected. The patient died the next day. Therapeutic failure was explained by autopsy findings; pleural adhesions and the pneumonic lung prevented collapse.

KAUNITZ, J.: Mumps Meningitis. *Journal of the American Medical Association,* May 18, 1920, pp. 1448-1449.

The author states the most frequent complication seen in mumps is orchitis. The rarer complications are meningitis, encephalitis, neuritis, ovaritis, endocarditis, arthritis, nephritis, mastitis and vulvovaginitis. The complications appear in most instances in from four to seven days. The meningitis of mumps is very little known. During some epidemics there appear to be more meningeal complications than in others. As most patients recover after a few days' illness, it is probable that the meningeal condition is lost sight of, particularly in the milder cases. The pathology is that of serofibrinous meningitis, in some cases invading the brain tissue and nerves at the base of the brain. The symptoms and signs resemble those of tuberculous meningitis, but the course of the disease is very different. Most patients recover, though in some cases temporary neuritis has occurred. Atrophy of the optic and auditory nerves may take place. The gravest forms are those in which the substance of the medulla or the vagus nerves are affected.

Kaunitz reports 3 cases in children aged four, five and nine years respectively. In 2 of them the attacks were comparatively mild, and might have been mistaken for gastro-intestinal attacks. In the third case there was no doubt of the diagnosis from the first, and the patient's life was probably saved by lumbar puncture, which was not necessary in the other two cases. The value of early spinal puncture cannot be too much emphasized in this type of case.

SHEFFIELD, H. B.: The Present Status of Poliomyelitis. *New York State Journal of Medicine,* May, 1920, pp. 146-155.

Mode of Infection.—Experimental and clinical evidence is accumulating which tend to show that the virus of poliomyelitis enters the human body most frequently, even if not exclusively, through the upper respiratory tract and is carried to the cerebrospinal system by means of the lymphatics.

Diagnosis.—Typical, spinal poliomyelitis, *i. e.*, sudden more or less complete, flaccid paralysis of one extremity or several of them or of a group of muscles of the trunk, preceded by moderate fever and other symptoms of an ordinary cold indigestion, usually presents no diagnostic difficulty whether or not it is met with during the prevalence of an epidemic. If pain forms a conspicuous symptom, poliomyelitis may in the initial stage be taken for scurvy, rheumatic fever, or polyneuritis. During an epidemic of infantile paralysis diverse tuberculous and traumatic affections of the bones and joints frequently lead to diagnostic errors.

In doubtful cases a roentgen ray and tuberculin test will readily clear up the diagnosis.

Great difficulty is encountered in interpreting correctly the other types of poliomyelitis, more especially in the absence of an epidemic. Thus, the pontine and cerebral types have several symptoms in common with acute meningitis and secondary encephalitis. But on closer examination it will usually be noted that stupor, Kernig's and Brudzinski's signs appear in meningitis earlier than in poliomyelitis and are also more marked and more constant. On the other hand, the paralysis appears earlier and is more extensive, as a rule, in the latter affection. Furthermore, secondary encephalitis follows or complicates some infectious disease, *e. g.*, influenza, pneumonia, scarlatina.

As errors in the diagnosis may prove instrumental in spreading the affection to all others coming in contact with the patient, we should proceed promptly with a careful examination of the cerebrospinal fluid. The cerebrospinal fluid taken during the early days of the disease, and especially, before the onset of the paralysis, as a rule shows an increased cell count with a low or normal globulin content. At this early stage, the polymorphonuclears may amount to ninety per cent of the total cells. Most fluids, however, show almost exclusively lymphocytes and large mononuclear cells.

As the cerebrospinal fluid of poliomyelitis greatly resembles that of tuberculous meningitis, it is advisable to exclude the presence of tubercle bacilli in the former. Where further confirmation of the diagnosis becomes necessary, we may resort also to the colloidal gold reaction of the cerebrospinal fluid, which, according to Felton and Maxcy, is constant and positive in the acute stage of poliomyelitis.

The blood picture of patients suffering from poliomyelitis is of some diagnostic value if taken in connection with other available evidence. There is usually a leukocytosis of from 15,000 to 30,000 and the polymorphonuclear cells are increased at the expense of the lymphocytes.

With the earliest detection of suspicious signs of acute poliomyelitis, the patient should be promptly isolated, and handled in the same manner as prescribed by the health authorities in other communicable diseases. During an epidemic, vomiting, fever, headache, diarrhea, congestion of the throat, rigidity of the neck and drowsiness should be looked upon as suspicious of poliomyelitis. When the diagnosis has been confirmed, the attendant should be quarantined together with the patient for about three weeks. Before lifting the quarantine, the clothing, bedding, utensils, etc., of the patient should be disinfected and the sick room and its contents thoroughly cleaned and aired.

Neustaedter, M.: Present Status of Poliomyelitis: Its Etiology, Pathology, Clinical Manifestations and the Present Modes of Diagnosis and Treatment. *International Clinics*, 1920, i, 82-97.

The *mode of infection* is now accepted by all investigators to be by way of the perineural lymph-spaces, the virus finding access through the nasopharyngeal mucosa. This is accomplished through inhalation or contact with articles of diet contaminated with virus. One school, headed by Wickman on the continent and Flexner here, maintains that the disease is communicated by contact, making it highly contagious; the other school counting the majority of investigators, maintains that the infection is indirectly transmitted. Flexner's hypothesis is that of direct contact by sneezing, coughing and kissing. This may be the case in some instances, but experience refutes the theory that it works in every instance.

Since it has been shown that drying does not destroy the activity of the virus, it is conceivable that the nasal secretions and feces containing the virus, when cast about in a careless manner, will become attached in the dry state to living beings or their clothing and in this manner carried and disseminated. After it has been conclusively shown (by Neustaedter and Thro) that the virus exists in a visible state in the dust of the sick room, the above-stated theory assumes a rather convincing character. In this way it may be explained how pet animals are transmitting the virus. It is conceivable that flies may carry the dried virus as they do pollen grains and deposit it upon food articles which would infect when coming in contact with the pharyngeal mucosa. However, this does not mean that the fly is the host. In Sweden, Norway and Alaska where flies do not exist, severe epidemics are recorded. The flies are merely a mechanical means of transmitting the virus; the theory of transmission by the *bite* of the fly can be safely dismissed.

The *indirect method* would also explain how it comes about that cases appear in isolated places, when we remember that food provisions and merchandise are carried to those isolated places. Either the carriers or the articles are infected with the dried material which comes in contact in some manner with nasopharyngeal mucosa and the damage is done. When we contemplate the highly organized complexity of society and remember that no place, strictly speaking, may be called isolated, the infection through indirect method is easily explained.

Poliomyelitis shows very definite seasonal variations in its incidence. The records of epidemics in many countries show that it occurs during the summer months and reaches

its maximum in the late summer and early autumn. Sporadic cases occur everywhere throughout the entire year.

The *period of incubation* is accepted to be from 2 to 30 days. Neustaedter has a case on record with an incubation period of one day.

The main difficulty lies in the possibility of *early diagnosis* of the disease before the onset of the paralysis.

As in the case of every infectious disease, so here we have a prodromal stage. We may expect very early fever as the first sign, accompanied in one-half of the cases by vomiting, with or without diarrhea. Alongside with this there are nasopharyngeal symptoms. Frequently we hear that the patient began to sneeze, or made attempts at sneezing, and at times this is accompanied by copious nasal discharges. Upon inspection we find a somewhat anemic, glistening, edematous condition of the nasopharyngeal muscosa. This condition persists for a few weeks after the paralysis has set in and then changes to an anemic atrophic state. Headache and pain, as a rule, are constant accompaniments. There is pain in the extremities and back on passive motion, sometimes gastro-intestinal disturbances, a peculiar condition of the nasopharyngeal mucosa and the cytological, chemical and serological alterations of the cerebrospinal fluid.

It requires no diagnostic acumen to recognize poliomyelitis when, with all these symptoms after the prodromal stage, a flaccid paralysis appears in one or more extremities.

We cannot be certain in the preparalytic stage, nor are we at all positive in abortive types that we have dealt with poliomyelitis and especially is this true in the spastic hemiplegias and other cerebral types.

In cases of cranial nerve involvement and also in peripheral nerve affections with no other manifestations after a febrile illness, it is not fair to call the case one of poliomyelitis. Since different sites of the cerebrospinal axis may be affected and various symptom complexes may arise, it would be an idle task to enumerate the various diseases of the central nervous system as differentiated from poliomyelitis. Given the symptoms of a febrile reaction and a pathological cytology and chemical alteration of the spinal fluid, the complement fixation with the specific antigen ought to enable us to establish a fairly exact diagnosis.

Since the disease is contagious and is disseminated by healthy as well as by sick carriers, prophylactic measures are essential. A strict quarantine for a number of weeks is the first prerequisite.

GLANDS OF INTERNAL SECRETION

Ukita, T.: Influence of Thyroidectomy on Gestation and On the Fetus. *Acta scholae med. univ. imp.,* Kioto, 1919, iii, 287; abstracted in *Endocrinology,* 1920, iv, 712.

Assuming that the thyroid begins to function after the middle of gestation Ukita thyroidectomized six pregnant rabbits between the seventh and tenth days after conception. Duration of pregnancy was nearly doubled. The young were small and weak with hypertrophied thyroids. The hypertrophy was considered compensatory to maternal loss.

Shears: Obstetrics, Normal and Operative. 1920.

Page 215. — The thyroid gland usually undergoes moderate hypertrophy during

pregnancy. Now and then there is marked enlargement which, however, disappears after delivery. The enlargement is most marked in first pregnancies. The alleged relation of the thyroid gland and its secretion to the toxemia of pregnancy and to eclampsas are discussed elsewhere. Personally I do not believe that it is a specific relation, but that if thyroid extract does good in this condition it is by its stimulating effect upon general metabolism and especially upon the oxidative processes.

Page 262.—Thyroid insufficiency has been held by Llange, Nicholson, and others to be the cause (eclampsia). It is probable that if thyroid extract does good in these cases, it must be by its well-known effect in stimulating general metabolism and indirectly oxidation.

Cases in which the enlargement of the gland was associated with hyposecretion (myxedema) would be benefitted by thyroid therapy. (Reviewer's remark.)

Barnes, F. M., Jr.: The Neurological Reactions in Gonad Insufficiency. *Journal of the Missouri State Medical Association.* August 1920, xxiii, No. 8, pp. 323-325.

In a given syndrome, which is the primary causal factor,—the nervous disorder or the endocrine disturbance?

We are coming more and more to look upon nervous phenomena in diseased states as reactions on the part of the nervous system and not as primary disease of the nervous system itself. It is a well-recognized fact that certain psychic conditions exert a great influence on the discharge from the glands of internal secretion. Although our knowledge of internal secretions virtually had its beginning with the work of Brown-Sequard on testicular extracts, we to-day know little of the neurologic reactions associated with male gonad insufficiency as compared with the female. In the female, menstruation has made the development and cessation of gonad activity easy to determine, and for this reason much study has been given to the correlation of neuropsychic state and ovarian disturbance. As a result of this, neuroses or psychoses occurring during the puberal and climacteric epochs and in association with the menstrual period or gravidity, have been described and we have heard of adolescent, menstrual, peurperal or climacteric psychoses. In the author's opinion, these states are to be looked upon as mental reaction types and not as psychoses in any way characteristic of the epoch with which they are temporarily or causally associated.

Doubt has been expressed as to whether gonad (ovarian) insufficiency can directly cause any true psychosis or whether this endocrine element acts as an accessory moment only. The reactions on the part of the nervous system and psyche to gonad insufficiency are less likely to express themselves in psychoses than in fundamental alterations in personality and neuroses of lesser or greater severity. The types of the neurologic reactions will depend upon several factors, primarily the age of onset of the insufficiency, its acuity or chronicity and its extent or degree of completeness. These factors are all illustrated by the different types of gonad insufficiency which we meet clinically, such as eunuchism, eunuchoidism, the late castrate and the climacterium.

Prior to puberty there is much similarity of the sexes, both physically and mentally. At the time of puberty there comes a certain degree of unrest and disquiet, sometimes even a sort of anxiety state. This period which in the male and female is marked by a decided neuropsychic instability, is not infrequently the time of the first appearance of definite mental or nervous disorder.

In the eunuch, where the absence of the gonads has been congenital, or very early acquired, the sexuality does not develop, secondary sex characters are lacking in appearance and very frequently mental enfeeblement is a marked feature; a lack of mental growth and development appears to parallel the gonad insufficiency.

In the late castrate, we meet with an entirely different situation. In this type, gonad insufficiency is abrupt in its onsets

and at a period when sexual maturity has been reached. In general, the neuropsychic equivalents of this gonadism are seen in depressions and apathies. The neurotic symptoms of the late castrate are very numerous.

The nervous symptoms occurring in the late female castrate (oöphorectomy should be avoided when in any safe way possible) may present themselves about the time when the period would occur, or they may appear during the interval. Among the molimina climacteria, the occurrence of a drawing, crampy pain in the lower part of the abdomen or in the pelvis, should be mentioned. Headache is at times particularly severe and insistent, usually frontal in location. The more distinctly nervous disorders include fainting attacks, mental states of anxiety, unaccountable weakness, tinnitus, chills and the like. Other definite symptoms are hot flushes and fainting attacks. It is characteristic of this type of gonad insufficiency as well as of that occurring during the natural menopause that mental states of depression predominate. Most of these symptoms begin to occur within from three to five weeks after the operation, and sometimes, in exceptional cases, not for a few months.

The neuropsychic manifestations of the female climacterium are generally recognized, but it is not so generally recognized that its counterpart, even in more pronounced intensity, is frequently met with in men. In men, between 47 and 57, there first occurs a lessening or loss of libido and potency, then they become nervous, irritable, restless and have crying spells. All this is accompanied by hot flashes, cardiac palpitation, weakness, fatigue and insomnia. One easily recognizes in this symptoms picture of molimina climacteria viri the resemblence to the neuropsychic state in women during the climacteric.

At the conclusion of this period, both in men and in women, quite a different picture is to be found.

With the transition to asexuality with age there appears a certain mental tranquillity and peaceful outlook on life, the attributes of a mind no longer in the actively strong producing stage. This period represents the counterpart of that associated with the prepuberal age: in the one, gonad activity with its influence on the neuropsychic mechanisms has not developed, whereas in the other, such activity has entirely ceased.

Judd, E. S.: Intrathoracic Goiter. *International Clinics*, 1920, i, 149.

Intrathoracic goiter is defined as one in which the greater part of the thyroid enlargement is situated within the thorax. A *substernal* goiter is one which is only a projection of one part of the thyroid into the chest. The totally intrathoracic type occurs in the form of an adenoma, cyst, or tumor within the mediastinum and there may or may not be any evidence of goiter in the cervical region. The lower limits of the substernal goiter may be outlined when the patient swallows, while the upper limits of the intrathoracic goiter may just be perceptible.

Intrathoracic goiter usually originates from one of the lower poles of the thyroid gland. It has been said that it frequently originates from the isthmus, but Dr. Judd's observations lead us to believe that it begins more often in one of the lateral lobes. If it develops from a part of the cervical thyroid it always retains some connection with it, either a direct continuation of thyroid tissue or at least a communication of fibrous tissue. This connection between the cervical and intrathoracic parts of the goiter occurs only when the intrathoracic enlargement originates from the thyroid. If the intrathoracic enlargement arises from an aberrant thyroid in the mediastinum there is no connection between the two, although it is possible that a goiter may develop from aberrant thyroid tissue situated anywhere from the tongue to the mediastinum; apparently intrathoracic goiter does not often originate in this manner. In a few instances the author has seen the intrathoracic tumor completely separated from the thyroid gland; in one of his cases, the cervical goiter had been removed

elsewhere apparently without the knowledge that an intrathoracic tumor existed. Certain kinds of cervical goiter apparently have a tendency to become intrathoracic; this tendency according to Crotti (cited by Judd) is enhanced by coughing or swallowing or by certain rotations and flexions of the head, by gravity. This, however, does not occur in a fixed goiter but it may occur in one which is already movable, such as the "diver's" or "floating" type or cases of thyroptosis. Von Eiselsburg (cited by Judd) has called attention to the thyroptosis which occurs in old emphysematous individuals and says that the condition tends to make the goiter intrathoracic. Judd has no doubt that many intrathoracic goiters are first cervical, although they dip into the mediastinum with the motions of coughing and swallowing. As they become larger they become more or less fixed under the sternum and later they become totally intrathoracic. Those originating from the aberrant glands are intrathoracic from the beginning. Substernal projection of the lobes of the thyroid occurs in almost fifty per cent of cases coming to operation while the intrathoracic goiter represents less than five per cent of the total number of cases. Totally intrathoracic goiter without evidence of cervical enlargement represents less than one per cent of all goiter cases.

Histologically, the most common type is the fetal adenoma or cystadenoma. These tumors make up the greatest part of the growth, although there is usually a capsule surrounding it and colloid material within. Hypertrophied gland of the exophthalmic type is never seen in totally intrathoracic goiter and, as a matter of fact, the author has never seen a thyroid lobe entirely within the chest. The intrathoracic goiter is always an outgrowth from one part of the gland, or is separate from it. A substernal projection in an exophthalmic goiter is common. When a new growth such as carcinoma invades an intrathoracic thyroid, it usually becomes fixed very early to the surrounding tissue and is most too difficult to eradicate at operation. Sudden and continuous symptoms of suffocation as a result of one of these tumors is as a rule suggestive of malignancy.

Pressure from the growth on the large vessels may seriously interfere with the circulation so that the superficial vessels of the neck and chest become very greatly dilated. Intrathoracic goiter, more often than cervical goiter causes disturbance in the recurrent laryngeal nerve. A marked limitation in motion in one of the arythroids suggests the presence of mediastinal goiter.

The symptoms of intrathoracic goiter, according to Judd, are generally more intense than those of ordinary cervical goiter. The slightest exertion may give rise to severe choking spells and suffocation; these may even come on during sleep. At times the patient may be unable to breath except by holding the head in a certain position. These patients are often mistakenly treated for asthma. If the tumor is situated posteriorly it may interfere considerably with swallowing and choking spells will be pronounced. Occasionally the tumors may be felt by introducing the finger into the pharynx. In many cases the diagnosis can only be established by *x*-ray examination. Pressure on the trachea and bronchi may result in auscultatory signs in the chest that a lesion of the lungs is suspected. The so-called mechanical goiter heart, which may be due to cyanosis, and a toxic goiter heart are often associated conditions. In many instances, the syndrome of thyrotoxic goiter exists. Crotti mentions cases in which the growth was so large that it pushed the manubrium forward. In some cases the diagnosis may be made by feeling an impact when the finger is pressed into the sternal notch when the patient swallows. Frequently a mediastinal tumor is recognized, but it may be difficult to decide whether the tumor is an intrathoracic goiter, an enlarged thymus, syphilis or tuberculosis of the mediastinum, or possibly an aneurysm of one of the large vessels. In these cases the *x*- ray is especially helpful in the differentiation.

The prognosis of operation for the removal of these goiters is, according to Judd,

much better than might be expected; in spite of the fact that the tumor is interfering greatly with the breathing apparatus, the technical part of the operation is seldom the cause of death. Kocher's death rate was about 1 per cent, and in Judd's series of cases of several hundred intrathoracic goiters no death resulted from the operation itself. The principal difficulty is the same as in the thyrotoxic cervical goiter; the mortality in all thyrotoxic goiters is about 3.5 per cent; the cause of death is due to the fact that damage caused by degeneration of the cardiac muscle has reached the critical state. Most patients with thyrotoxic goiter stand the operation well, but they belong to the group of cases in which sudden death may occur from acute cardiac dilatation.

At this point in his paper the author describes the technic of the operation, which for the purposes of this abstract need not be discussed here, except to emphasize a point which he makes in reference to the fact that during the first few days after operation the swelling in the neck may be so marked as to produce sudden choking spells and marked cyanosis. On this account he has always in these cases a tracheotomy outfit in the patient's room. Judd prefers to keep the trachea open for several days rather than to allow the patients with damaged hearts to have repeated chocking spells or pass through a long period of difficult and labored breathing. About one in every 500 goiter cases requires a tracheotomy.

Contrary to several writers, the author found in his series that intrathoracic goiter is more common in the female than in the male. 124 of his patients were females and 26 males. As this condition is often associated with cervical goiter and as cervical goiter is much more common in the female, it seems likely that the proportion of females to males will hold in the intrathoracic cases.

The condition was more common between forty and fifty years of age than at any other period of life; almost all patients were between thirty and sixty.

The chief complaint was a sense of pressure (in 61 cases); dyspnea was quite marked in 54 cases; dilatation of the veins over the lower part of the neck and upper chest was very noticeable in 22 of the 150 cases. Dysphagia was present in 13 cases; pain in the chest in only 5 cases. Not all of the 150 goiters were completely intrathoracic and therefore many of them did not cause the marked symptoms frequently present.

The tumor was found on the left side in 81 cases; on the right side in 45; in the middle, in only 4 cases. In sixteen the condition was on both sides.

Pathologically, 141 were classified as adenoma, one as hypertrophy, which undoubtedly meant that there was hypertrophy with small adenomas; two were carcinomas, and two were colloid goiters with small adenomas.

If a preoperative diagnosis of malignancy is established, the author does not advise operation, because when the malignancy has reacted the degree at which it can be recognized clinically, it has already infiltrated the surrounding tissues to such an extent that operation is out of the question.

Morris, M. F.: The Therapy of Hyperthyroidism. *Medical Record,* Sept. 11, 1920, xcviii, 431.

According to Morris the cause of hyperthyroidism is practically always toxemic or neurotic in origin.

If the cause be toxemic, the first therapeutic aim is the removal of the source of toxemia. In cases of neurotic origin, which includes the cases caused by fright and trauma, diet and rest often effect a cure.

Certain hygienic measures are very useful in the treatment of cases of thyroidal hypersecretion. Good nursing, pleasant quiet surroundings, warm fresh air, proper bathing with absolute mental and physical rest is necessary in the treatment of all but mild cases. A suitable diet is most beneficial. A very nutritious diet owing to catabolic loss from excessive catabolism is important. Meats according to Falta increase the thyroid secretion and should be omitted, while

carbohydrates which tend to decrease this secretion are especially indicated. Considerable quantities of Vichy water are useful because they neutralize whatever phosphoric acid the blood may contain.

The best medicinal agents for diminishing thyroid activity are the vasoconstrictors of which ergotin and the salicylates are the best examples. The former is administered in one grain doses t. i. d. The neutral hydrobromid of quinin is both a vasoconstrictor and a phagocytic stimulant. The quinin and salicylate are given in 10-grain doses t. i. d. Pituitary extract, adrenalin, scopolamin, and spartein also constrict the vessels. Belladonna and Hyoscyamus are valuable in cases with tremor; bromids and chloral relieve the nervousness and insomnia. Arsenic acts both as a tonic and as a depressant on the functions of the thyroid. Lecithin, in one teaspoonful doses, t. i. d. and thymus gland desiccated in 5-grain doses t. i. d. are useful because they tend to restore to the nerve cells their functional constituents which have been more or less destroyed by the thyroid hormone. For this purpose iron preparations are also of value.

The author is not very enthusiastic about the different kinds of sera which have been put on the market for the treatment of this disease. Nor has he seen good results from antithyroidin, rodagen and thyroidectin.

The *x*-ray given in conjunction with proper medicinal treatment yields excellent results. In employing the former it is necessary to carefully estimate the dosage on each occasion, the best results being obtained with small doses given at frequent intervals with adequate filtration for the absorption of the soft rays. The thymus should also be *x*-rayed each time. When the *x*-rays fail radium properly employed gives satisfactory therapeutic results. Neither the *x*-rays nor radium should produce a dermatitis.

Injections of boiling water in some cases result in some improvement. However, there occurred three deaths from this procedure. Watson has used injections of quinin and urea hydrochlorid with good results.

When all these forms of treatment have failed, the author advises surgical measures. When pressure symptoms develop or malignant degeneration of the thyroid occurs immediate surgery is indicated.

Fussell, M. H.: Diagnosis and Treatment of Hyperthyroidism. *New York Medical Journal*, Aug. 14, 1920, cxii, 205.

After describing the general symptomatology of hyperthyroidism the author sketches briefly the later laboratory methods which help in the differentiation of this condition from other conditions due to thyroid gland disturbance. He refers to (1) increased metabolic rate, (2) thyroid feeding, (3) adrenalin test, Goetsch test, and (4) decreased sugar tolerance. He quotes Plummer, who in a tabulation of 578 cases of exophthalmic goiter found that while the nutrophils are low and the lymphocytes high, the blood count as a general rule is of relatively little value in diagnosis.

Fussell also emphasizes the well-known fact that successful treatment depends upon the decision as to whether the patient is suffering from one or another of the following conditions: (1) Neurasthenia; (2) irritable heart, or its synonyms, effort syndrome, functional palpitation; (3) organic heart disease; (4) tuberculosis; (5) interstitial nephritis; (6) gastro-intestinal disturbances; (7) arthritis; (8) local condition of the eye; and (9) hypertrophic atoxic goiter. After differentiating these conditions and illustrating some of them by case reports he discusses in detail treatment.

He recommends that the following plan can be followed in the treatment of hyperthyroidism with the minimum of fatality:

(1) An early diagnosis is imperative.

(2) Every patient should be put to rest in order to reduce the rate of metabolism. Many patients will be cured by this means.

(3) Patients who cannot give the time to a thorough trial of rest should be operated upon early, after a partial rest.

(4) Patients who are very toxic must always be put at rest and given other appropriate treatment before any surgical measures are attempted.

(5) If patients fail to improve under rest, ligation should be performed, or the roentgen ray should be used tentatively to reduce the metabolism rate, until resection can be done.

(6) In very severe cases in which the patients appear to be approaching death and the *x*-ray cannot be employed, a ligation after the method of Wood may be done.

Fussell has had no experience with injection methods, but is of the opinion that with access to certain methods of surgery injections seem cumbersome and uncertain. He is firmly convinced that in patients who do not promptly respond to rest, surgery by all odds is the proper procedure.

BACTERIOLOGY AND PATHOLOGY

Comby, J.: Acute Chorea and Epidemic Encephalitis. *Bulletins et memoires de la société médicale des hôpitaux de Paris,* May, 6, 1920, xxxvi, No. 15, pp. 556-7

In a certain number of cases, Sydenham's chorea shows pathologically a moderate but diffuse inflammation of the cerebrospinal axis and meninges. This inflammation is characterized by a very marked congestion and leukocytic infiltration, with edema, necrosis and hemorrhages. The neuroglia is increased in amount. The nerve cells are altered.

These lesions are most intense at the base of the brain. The author is of the opinion that fatal cases of chorea of Sydenham belong to the same category as do cases of epidemic encephalitis.
cations.

Harvier, P. and Levaditi, C.: Anatomic and Experimental Evidence of the Identity of Acute Febrile Chorea and Encephalitis Lethargica. *Bulletins et memoires de la société médicale des hôpitaux de Paris,* May 13, 1920, xxxvi, No. 16, pp. 583-8.

The authors treated a patient suffering with acute, febrile chorea, complicated by a purpuric erythema of the extensor surfaces of the extremities and a low blood-pressure. Death occurred about a week after the onset.

Histologic examination of the nerve centers, showed lesions identical with those of epidemic encephalitis.

Inoculation into rabbits of an emulsion of the brain substance, gave the following results: The animals died after a period of from 9 to 15 days. Four successive passages of the virus have been made to date. Pathologically, the lesions observed in these rabbits, postmortem, lead the authors to believe that the nerve centers of their patients, who died of acute chorea, contained the virus of epidemic encephalitis.

Ritter, J.: Why Have Both the Primary Focal Infection and the Subsequent Pulmonary Tuberculous Disease Their Origin Nearly Always in the Air Vesicles and Not in the Bronchial Tubes? *Illinois Medical Journal,* April, 1920, xxxvii, 257.

The author summarizes his answer to the above question as follows:

(1) The bronchial tubes are accompanied by smooth muscle fibers throughout; at their distal ends all these fibers cease, but a ring of unstriped fibers guard, at these ends, the entrance of air into the pulmonary vesicles.

(2) Within the walls of the bronchial tubes a fine network of lymphatic vessels lines the entire walls throughout, but it stops abruptly at the ring of muscle fibers situated at the terminal ends of the tubes.

(3) Ciliated epithelial cylindrical cells line the entire bronchial tubes except the alveolar ducts, the terminal bronchi of which are lined with cuboidal epithelium. Both the ciliated cylindrical and the cuboidal epithelial cells are of the nuclated variety and they do not extend beyond the ring of muscle fibers mentioned above.

(4) But the epithelium which lines the alveolar walls, the air sacs, distal to this ring of muscle fibers, is of the polygonal variety. These epithelial cells are all non-nucleated; within the walls of the air vesicles no lymph vessels are found nor are muscle fibers demonstrable.

(5) But the author has also observed that epithelial cells which are non-nucleated are short lived, and are easily destroyed, have no power of resistance or defense and cannot protect themselves against foreign bodies, such as bacteria, particles of dust, tubercle bacilli, etc.

(6) And it is known that on the living, healthy nucleated epithelium, lining the bronchial tubes, the tubercle bacillus is perfectly harmless. For that reason pulmonary tuberculosis never has its origin in these tubes; air vesicles are all lined with polygonal cells, which are non-nucleated and which are situated beyond that ring of muscle fibers, which, if competent, that is if in perfect health, will prevent the entrance of tubercle bacillus upon pulmonary tissue, where it grows and vegetates most readily.

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J. E. Austin, M. D.
Robert H. Babcock, M. D.
C. C. Bass, M. D.
Harvey Beck, M. D.
Charles Henry Beecher, M. D.
A. L. Benedict, M. D.
Walter L. Biering, M. D.
F. T. Billings, M. D.
J. M. Blackford, M. D.
David Bovaird, M. D.
Louis F. Bishop, M. D.
Percy Brown, M. D.
A. W. Crane, M. D.
J. S. Davis, M. D.
W. W. Deaderick, M. D.
W .W. Duke, M. D.
L. E. De Buys, M. D.
A. D. Dunn, M. D.
F. X. Dercum, M. D.
Wm. Engelbach, M. D.
John Favill, M. D.
Bernard Fantus, M. D.
M. L. Graves, M. D.
E. A. Gray, M. D.
Charles Lyman Greene, M. D.
S. R. Haythorne, M. D.
J. N. Hall, M. D.
W. W. Herrick, M. D.
Preston Hickey, M. D.
J. H. Hoxie, M. D.
Walter J. James, M. D.
C. G. Jennings, M. D.
Clyde F. Karshner, M. D.
Theophil Klingman, M. D.
Randolph Lyons, M. D.
Charles G. Lucas, M. D.
I. Macht, M. D.
W. H. Mercur, M. D.
Wm. Carpenter MacCarty, M. D.
H. B. Mills, M. D.
L. S. Milne, M. D.
Wm. Gerry Morgan, M. D.
J. B. McElroy, M. D.
Frank A. McJunkin, M. D.
George M. McCaskey, M. D.
C. L. Overlander, M. D.
Milton M. Portis, M. D.
Edward Quintard, M. D.
Herbert W. Rich, M. D.
Thomas F. Reilly, M. D.
C. G. Richards, M. D.
Ernest Reudiger, M. D.
Lee Wright Roe, M. D.
Adolph Sachs, M. D.
Charles E. De M. Sajous, M. D.
Thomas E. Satterthwaite, M. D.
John P. Schneider, M. D.
Elsworth Smith, M. D.
Willard A. Stone, M. D.
W. H. Stewart, M. D.
M. A. Starr, M. D.
Henry E. Tuley, M. D.
E. L. Tuohy, M. D.
Henry L. Ulrich, M. D.
Aldred Scott Warthin, M. D.
Luther F. Warren, M. D.
Louis M. Warfield, M. D.
Frank B. Wynn, M. D.

CANADA

E. P. Benoit, M. D.
J. A. Elliott, M. D.
John MacGregor, M. D.
John Lindsay, M. D.
J. H. McPhedran, M. D.
E. N. Montgomery, M. D.
Arthur W. Moody, M. D.

ANNALS OF MEDICINE

VOLUME I FEBRUARY, 1921 NUMBER 4

ROSTER OF MEMBERS OF THE AMERICAN COLLEGE OF PHYSICIANS TO FEBRUARY, 1921

ALABAMA

Mobile
Roe, Lee Wright

ARKANSAS

Hot Springs
Deaderick, Wm. H.
Thompson, Lloyd

CALIFORNIA

Los Angeles
Brooks, Herbert Thomas
Browning, Charles C.
Byrnes, Ralph R.
Campbell, Ralph
Crispin, Egerton L.
Frick, Donald J.
Granger, A. S.
Hart, Lasher
Hunter, George Graham
King, Jos. M.
Lissner, Henry H.
Moore, Ross
Newton, E. Avery
Scott, A. J., Jr.
Soiland, Albert
Wessels, Walter F.

Monrovia
Pottenger, F. M.

Oakland
Strietman, Wm. H.

Pasadena
Condit, Joseph
Mixsell, Raymond B.
Newcomb, Arthur T.
Stone, Willard J.

CALIFORNIA—*Continued*

Sacramento
Gundrum, F. F.

San Diego
Pickard, Rawson J.
Pollock, Robert

San Francisco
Voorsanger, Wm. C.

COLORADO

Boulder
Gilbert, Oscar Monroe

Denver
Arndt, Rudolph W.
Arneill, James Rae
Bonney, Sherman G.
Burnett, C. T.
Hall, Josiah N.
Love, Tracy
Nenhaus, G. E.

DISTRICT OF COLUMBIA

Washington
Barnes, Noble P.
Morgan, William Gerry
Mallory, William J.
Roy, Phillip S.
Verbrycke, J. R., Jr.

FLORIDA

Jacksonville
Love, James

GEORGIA

Atlanta
Bunce, Allen H.
Roberts, Stewart R.

GEORGIA—*Continued*

Augusta
Mulherin, W. A.
Murphy, Eugene E.

ILLINOIS

Chicago
Babcock, Robert H.
Black, Robert A.
Blackwood, A. L.
Fantus, Bernard
Frick, Anders
Goldsmith, A. A.
Gray, Ethan Allen
Grubbe, Emil H.
Heintz, Ed. L.
Hoyne, Archibald L.
Karshner, Clyde F.
Kaufmann, Gustav L.
Krafft, Jacob C.
Leonard, Edward F.
Lewison, Maurice
Metcalf, Walter
Moyer, Harold
Norden, Henry A.
Orndoff, Benjamin
Patton, Joseph M.
Pietrowicz, Stephen R.
Portis, Milton M.
Quinn, Wm.
Sempill, Robert A.
Seufert, E. C.
Sheets, Vaughn L.
Smithies, Frank
Stearns, Wm. G.
Tice, Frederick
Trostler, I. S.

Decatur
Jack, Cecil M.

Elgin
Gabby, Samuel Lee
Hinton, Ralph

Jacksonville
Dollear, A. H.

Joliet
Werner, Frederick Wm.

Moline
Beam, Hugh A.

Peoria
Parker, George

ILLINOIS—*Continued*

Rockford
Weld, Anna

Springfield
Norbury, Frank Parsons

INDIANA

Fort Wayne
McCaskey, George W.

Indianapolis
Olsen, Alfred Berthier
Schweitzer, Ada E.
Wynn, Frank B.

IOWA

Keokuk
Fuller, Frank M.

Des Moines
Ryan, Granville M.
Throckmorton, Tom Bently

Fairfield
Gaumer, Stewart

Sioux City
Meis, Edw. Wm.
Shuman, John Wm.
Williams, Edw. M.

KENTUCKY

Louisville
Barbour, Philip F.
Bayless, B. W.
Dowden, C. W.
Fleischaker, Frank W.
Jenkins, William A.
Lucas, Charles G.
Meyers, Sidney J.
Moren, John J.
Morrison, J. R.
Solomon, Leon L.
Thompson, Cuthbert B.
Tuley, Henry Enos
Young, W. J.

Lexington
Bradley, Ernest B.
McClymonds, Julian
Scott, John W.

KENTUCKY—*Continued*

Newport

Anderson, W. W.

LOUISIANA

New Orleans

Bass, C. C.
De Buys, L. R.
Lemann, Isaac Ivan
Lyons, Randolph

MAINE

Portland

Gehring, E. W.

MARYLAND

Annapolis

Bloedorn, W. A.

Baltimore

Beck, Harvey G.
Leitz, Frederick
Miller, Sydney R.
Ruhrah, John
Shearer, Thomas L.
Zueblin, Ernest

MASSACHUSETTS

Boston

Austin, A. E.
Brown, Percy
Dana, Harold W.
McCrudden, Francis H.
Otis, Edward O.
Overlander, C. S.

Springfield

Chapin, Lawrence D.

West Newton

Paine, N. Emmons

Worcester

Baff, Max
Bigelow, Edward B.

MICHIGAN

Ann Arbor

Klingman, Theophil
Marshall, Mark
Parnall, C. G.

MICHIGAN—*Continued*

Battle Creek

Mortensen, M. A.
Nelson, A. W.
Pritchard, J. S.
Roth, Paul
Stewart, Charles D.

Detroit

Aaron, Charles D.
Biddle, Andrew Porter
Breisacher, Leo
Cleland, James, Jr.
Conner, Guy L.
Dempster, James H.
DeWitt, A. S.
Donald, William M.
Evans, William A.
Haas, Ernest
Harison, Beverley Drake
Harvey, John Goold
Hickey, Preston M.
Hitchcock, Charles W.
Holmes, Arthus D.
Hoops, G. B.
Hoskins, Neal L.
Inglis, David
Kiefer, Guy L.
King, Dale M.
McKean, Geo. E.
Meloy, Carl R.
Mooney, Edward W.
Polozker, I. L.
Rich, Herbert M.
Sichler, E. H.
Starkey, Frank R.
Stephenson, Frank
Stevens, Rollin H.
Varney, H. R.
Watkins, John T.
Wendt, Leonard F. C.
Wilson, Walter, Jr.

Flint

Burr, C. B.
Clift, M. William
Knapp, M. S.
Marshall, William H.

Grand Rapids

Baker, Abel J.
Corbus, Burton R.
Gordon, T. D.

Grand Rapids—Continued
Johnston, Collins H.
Meengs, J. E.
Northrup, Wm.

Grandville
Brook, J. D.

Hancock
Fischer, Arthur F.

Kalamazoo
Crane, A. W.
Jackson, John B.

Lapeer
Kay, W. J.

Monroe
Southworth, Chas. T.

MINNESOTA

Duluth
Linnemann, M. L.
Martin, Thomas Roy
Rowe, Olin W.
Scherer, C. A.
Tuohy, Edward L.

Minneapolis
Avery, J. Fowler
Drake, Charles
Henry, Clifford E.
Rizer, Robert I.
Robertson, H. E.
Schlutz, Frederick W.
Schneider, John P.
Ulrich, Henry L.

Rochester
MacCarty, Wm. C.

St. Paul
Gager, Edw. C.
Greene, Charles L.

MISSOURI

Kansas City
Duke, Wm. W.
Hoxie, George W.
Milne, Lindsay S.
Murphy, Franklin E.

St. Joseph
Bell, John M.

MISSOURI—*Continued*

St. Louis
Baumgarten, Walter
Brady, Jules M.
Butler, L. P.
Clemens, J. R.
Engelbach, William
Hughes, Mark R.
Lyter, J. Curtis
Neilson, Charles Hugh
Smith, Elsworth S.
Zahorsky, John

MONTANA

Helena
Fligman, Louis H.

Miles City
Brown, George E.

NEBRASKA

Lincoln
Mayhew, John Mills

Norfolk
Foster, Robert H.

Omaha
Bliss, Rodney W.
Christie, B. W.
Clarke, Floyd
Crummer, Leroy
Dunn, A. D.
McClanahan, H. M.
Milroy, Wm. F.
Riley, Bryan M.
Sachs, Adolph
Tyler, Albert F.

NEW JERSEY

Atlantic City
Alsop, Thomas
Stewart, W. B.

Elizabeth
Stern, Arthur

Glen Ridge
Wallace, Henry

Greystone Park
Fisher, Ernest M.

Hackensack
McFadden, J. Howard

NEW JERSEY—*Continued*

Hoboken
Gelbach, R. W.
Von Deesten, H. L.

Montclair
Mabey, J. Corwin

Newark
Beling, C. C.
Bumsted, C. V. R.
Connolly, Richard N.
Elliott, Daniel
Kraker, David A.
Teeter, Charles Edwin

Paterson
Surnamer, Isaac

Secaucus
Pollak, B. S.

Trenton
McDonald, J. O.

NEW YORK

Albany
Conway, Fred C.
Rooney, James F.

Brooklyn
Andresen, A. F. R.
Bartley, E. H.
Blatteis, Simon R.
Block, Siegfried
Brush, Arthur C.
Butler, Glenworth
Clark, Raymond
Cornwall, Edward E.
Cross, Frank B.
Cruikshank, William J.
Eastmond, Chas.
Evans, George A.
Fairbairn, Henry A.
Forbes, George
Gordon, Murray B.
Gutman, Jacob
Ives, Robert F.
Joachim, Henry
Kandt, Hartwig
Kerr, LeGrand
Kingman, Robert
Little, George F.
Louria, Leon
Ludlum, Walter D.
Macumber, John L.

Brooklyn—Continued
Meagher, John F. W.
Moser, William
Moses, Henry B.
Northridge, W. A.
Parrish, Paul L.
Reque, P. A.
Smith, Archibald D.
Van Cott, J. M.
Wallace, Wesley H.
Warren, Luther
Webster, Henry C.
Wolfer, Henry

Buffalo
Benedict, A. L.
Kauffman, Lesser
Rice, James F.
Ullman, Julius
Walsh, Thomas J.

Clifton Springs
Woodbury, Malcolm S.

Cornwall
Winter, Henry Lyle

Forest Hills
Chalmers, Thomas C.

New York City
Baketel, H. Sheridan
Bassler, Anthony
Berg, Henry W.
Bishop, Ernest S.
Bishop, James
Bishop, Louis F.
Blumgarten, A. S.
Bovaird, David
Brooks, Harlow
Burr, Chauncey L.
Byrne, Joseph Henry
Byrne, Joseph
Caille, Augustus
Carman, Albro R.
Coleman, Daniel E.
Cooke, Robert A.
Fisch, Gustaf Grant
Friedman, G. A.
Goodhart, S. Philip
Grossman, Morris
Herrick, W. W.
Herrman, Charles
Hirsch, Isaac S.
Holland, Arthur L.

New York City—Continued
Hollis, A. W.
LeWald, Leon T.
Maier, Otto
Mannheimer, George
McKendree, Chas. E.
Meyer, Alfred
Nagle, James F.
Pease, Marshall C., Jr.
Quackenbos, Henry F.
Quintard, Edward
Reilly, Thomas F.
Rottenberg, I. M.
Sachs, L. B.
Satterthwaite, Thomas E.
Shelby, Edmund P.
Stark, Morris
Stewart, W. H.
Strodl, George T.
Sturtevant, Mills
Wallace, Wesley H.
Weber, Leonard G.
Wilcox, Reynold Webb
Poughkeepsie
Hill, Eben C.
Rochester
Button, Lucius
Darrow, Charles
Mulligan, Wesley T.
Sutter, C. Clyde
Williams, J. R.
Schenectady
Betts, Lester
Ham, Stillman S.
Scott, J. M. W.
Stone, W. B.
Vander, Bogart F.
Stapleton, S. I.
Foster, Albert D.
Syracuse
Gould, L. A.
Larkin, Albert E.
Levy, Harris I.
Loveland, B. C.
Watkins
Ferris, A. W.

NORTH CAROLINA

Charlotte
Munroe, John P.
Hoke County
McBrayer, L. B.

NORTH DAKOTA

Bismarck
Arnson, Julius O.
Ruediger, Ernest W.
Mandan
Altnow, H. O.

OHIO

Cincinnati
Bettman, Henry Wald
Cleveland
Cummer, C. L.
Phillips, John
Stone, Charles W.
Stoner, C. Willard
Springfield
Syman, Louis L.
Toledo
Brown, N. Worth
Levinson, Louis
Salzman, Samuel R.
Tenney, C. F.
Zbinden, Theodore
Youngstown
Morrison, Robert M.
Patrick, Harry E.

OKLAHOMA

Norman
Ellison, Gayfree
Oklahoma City
Andrews, Leila E.
Chase, A. B.
Fishman, C. J.
Moorman, L. J.
Riely, Leander A.
White, Arthur W.

OREGON

Portland
Baar, Gustav
Koehler, George F.
Matson, Ralph C.
Selling, Lawrence

PENNSYLVANIA

Germantown
Kelley, Thomas C.
Johnstown
Stewart, H. M.

PENNSYLVANIA—*Continued*

Philadelphia

Allyn, Herman B.
Bernstein, Ralph
Beardsley, Edward J. G.
Gordon, Alfred
Mills, H. B.
Musser, John H., Jr.
Rehfuss, Martin E.
Robertson, William E.
Roussell, Albert E.
Sajous, Chas. E. deM.
Stewart, F. E.

Pittsburgh

Barach, Joseph H.
Billings, F. T.
Breisacher, Leo
Gardner, E. R.
George, S.
Grayson, Thomas Wray
Grier, George
Haythorn, Samuel
Hollander, Lester
Johnston, George C.
Johnston, J. I.
Jones, Clement R.
Lichty, John A.
McCreedy, E. Bosworth
McKelvey, James P.
Mercur, Wm. H.
Ohail, Joseph C.
Schwartz, Lorraine L.
Thorne, John Mairs
Utley, F. B.
Wolff, Jacob

York

Comroe, Julius H.
Holzapple, C. E.

RHODE ISLAND

Providence

Farnell, Fred J.

TENNESSEE

Memphis

Krauss, William
Leroy, Louis
McElroy, J. B.
Warr, Otis

TEXAS

Houston

Agnew, James H.
Waples, F. A.

UTAH

Salt Lake City

Gibson, C. Cattett
Richards, G. G.

VERMONT

Burlington

Beecher, Clarence Henry

VIRGINIA

Charlottesville

Davis, John S.

Richmond

Brown, Alex G.
Gray, Alfred L.
Hodges, J. Allison
Hutcheson, J. M.
McGuire, Edward
Shepard, William A.
Tucker, Beverley R.
VanderHoof, Douglas

WASHINGTON

Seattle

Blackford, J. M.
Heussy, William C.
Stith, Robert M.

Tacoma

Brown, J. R.
Wilson, C. Stewart

WEST VIRGINIA

Clarksburg

Cherry, Solomon

Huntington

Vest, Walter E.

WISCONSIN

Fond du Lac

Calvy, P. J.
Layton, Oliver M.

Milwaukee

Henes, Edwin, Jr.
Jermain, Louis
McJunkin, Frank A.

Milwaukee—Continued
Patek, Arthur J.
Warfield, Louis M.

CANADA

Brandon, Manitoba
Carter, L. J.

London, Ontario
Crane, James W.
Ferguson, J. I.
Fischer, S. M.
Hale, George C.
Hughes, F. W.
Lindsay, John C.
MacGregor, John

Montreal, Quebec
Benoit, Em. P.

CANADA—*Continued*

Toronto
Elliott, J. H.
Loudon, J. D.

Winnipeg, Manitoba
Burridge, A. J.
Cadham, F. T.
Chestnut, William
Hunter, Charles
Mackey, Hugh
McMillan, J. Currie
Montgomery, E. W.
Moody, A. W.
Murdoff, H. M.
Rogers, William
Young, Fred A.

ROSTER OF MEMBERS OF THE AMERICAN CONGRESS ON INTERNAL MEDICINE TO FEBRUARY, 1921

ALABAMA

Mobile
Roe, Lee Wright

ARIZONA

Globe
Kirmse, Alvin

ARKANSAS

Hot Springs
Deaderick, Wm. H.
Eckel, Geo. Mitchell
Thompson, Lloyd
Little Rock
Bathhurst, Wm. R.

CALIFORNIA

Burbank
Rossiter, Frederick
Colfax
Peers, Robert
Glendale
Harrower, Henry
Keller, P. M.
Los Angeles
Barrow, John V.
Brooks, Herbert Thomas
Browning, Charles C.
Byrnes, Ralph
Campbell, Ralph R.
Crispin, Edgerton L.
Crum, Robert
Cummings, Rolland
Fishbaugh, E. C.
Frick, Donald
Granger, Arthur S.
Hart, Lasher
Hunter, George G.
King, Jos. M.
Lissner, Henry H.
Moore, Ross
Newton, E. Avery
Orbison, Thomas J.
Piness, George
Los Angeles—Continued
Scott, Alfred James, Jr.
Soiland, Albert
Taylor, F. W. Howard
Wessels, Walter
Visscher, L. G.
Monrovia
Pottenger, Francis M.
Oakland
Rowe, Albert H.
Strietman, Wm. H.
Pasadena
Breed, Lorena M.
Condit, Joseph
Luckie, James
Mackerras, R. H.
Mixsell, Raymond
Newcomb, Arthur T.
Stone, Willard J.
Wilson, J. M.
Redlands
Folkins, Frank H.
Riverside
Simonds, Paul E.
Sacramento
Gundrum, F. F.
Snyder, J. R.
San Diego
Churchill, James F.
Nielsen, John C. E.
Pickard, Rawson
Pollock, Robert
Yates, John C.
San Francisco
Lux, Frederick W.
Spier, Harry
Voorsanger, Wm. C.
San Leandro
Miller, Charles Howard

COLORADO

Boulder
Gilbert, Oscar Monroe

COLORADO—*Continued*

Denver

Amesse, J. W.
Arndt, Rudolph W.
Arneill, James Rae
Bonney, Sherman G.
Burnett, C. T.
Hall, Josiah N.
Love, Tracy
Neuhaus, G. E.
Waring, James J.

CONNECTICUT

Bridgeport

Lynch, John C.

Hartford

Altshul, H.
Witter, Orin R.

New Haven

Gompertz, Louis M.
Levy, Louis Henry

DISTRICT OF COLUMBIA

Washington

Barnes, Noble P.
Conklin, C. B.
Grayson, Cary T.
Heller, Joseph M.
Lee, Thomas S.
Mallory, Wm. J.
Morgan, Wm. G.
Reed, Edward H.
Roy, Philip S.
Verbrycke, J. Russel

FLORIDA

Jacksonville

Love, James
McGinnis, R. H.

Miami

Benton, G. H.

GEORGIA

Atlanta

Bunce, Allen H.
Lawrence, Charles Ed.
Paine, C. H.
Strickler, C. W.

GEORGIA—*Continued*

Augusta

Mulherin, W. A.
Murphy, Eugene E.
Roberts, Stuart R.

LeGrange

Huck, J. Gardiner

Macon

Spencer, Jacob John

ILLINOIS

Chicago

Anderson, James L.
Babcock, Robert H.
Berghoff, Robert S.
Black, Robert Alfred
Blackwood, A. L.
Block, Leon
Cramp, Arthur J.
Cross, Edwin
Fantus, Bernard
Favill, John
Ferguson, Clara
Frick, Anders
Frinch, Robert L.
Futterer, Gus A.
Goldberg, Benjamin
Goldsmith, A. A.
Graves, Nathaniel A.
Gray, Ethan A.
Gray, Herbert W.
Grubbe, Emil
Gruskin, B.
Heintz, Edward L.
Hickenlooper, C. B.
Hoyne, Archibald L.
Hubeny, Maximilian John
Jacques, John L.
Karshner, Clyde F.
Kaufmann, Gustav
Krafft, Jacob C.
Leonard, Edward F.
Lewison, M.
Martin, Albert
Meling, Nelson C.
Metcalf, Walter B.
Moyer, Harold
Norden, H. A.
Orndoff, Benjamin
Patton, Joseph M.

Chicago—Continued
Pietrowicz, S. R.
Portis, Milton M.
Post, Geo. W.
Quinn, Wm.
Roach, Richard A.
Sempill, Robert A.
Seufert, E. C.
Sheets, Vaughn L.
Slaymaker, S. R.
Smithies, Frank
Stearns, Wm. G.
Tice, Frederick
Torpey, James F.
Trostler, I. S.
Weatherson, John
Withers, G. H.
Cicero
Barnes, James
Danville
McCaughey, Robert S.
Elgin
Gabby, S. L.
Hinton, Ralph
Decautur
Jack, Cecil
Evanston
Hastings, W.
Hoopeston
Jones, Leroy
Joliet
Werner, Frederick Wm.
Moline
Beam, Hugh A.
Peoria
Brown, D. A.
Cutler, Wm. W.
Meixner, Fred M. F.
Parker, George
Vonachen, J. R.
Rockford
Anthony, R. E.
Mosley, H. P.
Weld, Anna
Springfield
Herudon, Richard F.
Norbury, Frank Parsons
Trapp, Albert R.
Winnetka
Blatchford, F. W.

INDIANA
Fort Wayne
McCaskey, George
Indianapolis
Ketchum, Jane M.
Kiser, E. F.
Lapenta, Vincent A.
Olsen, Alfred B.
Schweitzer, Ada
Wynn, Frank B.
LaFayette
Lairy, M. M.
South Bend
Cooper, A. L.
Sensenich, R. L.

IOWA
Centerville
Marker, John I.
Davenport
Decker, H. M.
Lamb, Fred G.
Des Moines
Bierring, Walter L.
Ryan, Granville N.
Strawn, J. T.
Throckmorton, Tom B.
Welpton, Hugh G.
Dubuque
Keogh, John V.
Fairfield
Gaumer, James Stewart
Keokuk
Fuller, Frank
Maquoketa
Bowen, A. B.
Mason City
Farrell, V. A.
Sioux City
Meis, E. W.
Shuman, John W.
Williams, Edw. M.
Webster City
Galloway, M. B.

KANSAS
Halstead
Baumgartner, E. A.
Herington
Reichley, Elmer J.

KANSAS—*Continued*

Lawrence
Nelson, C. F.

Milford
Brinkley, John R.

Wichita
Hoffman, J. Z.
Jager, T. J.

KENTUCKY

Lexington
Bradley, Ernest B.
McClymonds, Julian
Scott, John W.

Louisville
Barbour, Philip F.
Bate, R. Alex.
Bayless, B. W.
Dowden, C. W.
Finck, T. D.
Fleischaker, F. W.
Frazier, Ben Carlos
Graves, Stuart
Griswold, Alex. V.
Hays, George
Horine, Emmet F.
Jenkins, William A.
Keith, D. Y.
Kirk, J. Allen
Lucas, C. G.
Meyers, Sidney J.
Moore, John Walker
Moren, John J.
Morrison, J. R.
Nickell, A. W.
Solomon, Leon L.
Speidel, Fred G.
Thompson, Cuthbert
Tuley, Henry Enos
Young, W. J.

Newport
Anderson, W. W.

LOUISIANA

New Orleans
Bass, Charles
De Buys, L. R.
Lemann, Isaac Ivan
Lyons, Randolph H.

New Orleans—Continued
Tichenour, G. H., Jr.
Van Wart, Roy M.

MAINE

Portland
Burrage, Thomas J.
Gehring, E. W.

MARYLAND

Annapolis
Bloedorn, W. A.

Baltimore
Beck, Harvey G.
Hemmeter, John C.
Hirschmann, Isador I.
Leitz, Frederick
Miller, Syndey R.
O'Mara, John T.
Ruhrah, John
Shearer, Thos. L.
Zueblin, Ernest

Snow Hill
Riley, John L.

MASSACHUSETTS

Boston
Austin, A. E.
Bangs, Charles H.
Briggs, L. Vernon
Brown, Percy
Dana, Harold W.
Granger, Frank B.
Jelly, Arthur C.
McCrudden, Francis H.
Otis, Edward O.
Overlander, C. L.

Melrose
Ruble, Wells Allen
Smith, John Hall

Salem
Sargent, Ara N.

Springfield
Bacon, Theodore S.
Chapin, Lawrence D.

West Newton
Paine, N. Emmons

Worcester
Baff, Max
Bigelow, Edward B.

MICHIGAN

Ann Arbor

Cowie, David Murray
Gordon, Wm. Henry
Klingman, Theophil
Marshall, Mark
Parnell, C. G.
Warthin, Alfred Scott
Van Schoick, John

Battle Creek

Heald, C. W.
Mortensen, M. A.
Nelson, A. W.
Pitchard, J. S.
Roth, Paul
Stewart, Charles E.

Bay City

Baird, Fred S.
McLurg, John

Detroit

Aaron, Chares D.
Biddle, Andres Porter
Breisacher, Leo
Buesser, Frederick G.
Carlucci, P. F.
Carstens, Henry R.
Chester, John L.
Cleland, James, Jr.
Clippert, Frederick
Conner, Guy L.
Dempster, James H.
DeWitt, A. S.
Donald, William M.
Evans, W. A.
Haas, E. W.
Harrison, Beverly Drake
Harvey, John Goold
Hickey, Preston M.
Hitchcock, Chas. W.
Holmes, Arthur
Hoops, G. B.
Hoskins, Neal L.
Inglis, David
Ives, Augustus W.
Jennings, C. G.
Jennings, Alpheus F.
Kiefer, Guy L.
King, Dale M.
Lee, John
Lockwood, Bruce C.

Detroit—Continued

McClintic, C. F.
McGraw, Theo. A., Jr.
McKean, Geo. E.
McNaughton, Geo. P.
Meloy, Carl R.
Mooney, Edward W.
Polozker, I. L.
Rich, Herbert M.
Schmidt, Harry B.
Sherman, G. H.
Sichler, E. H.
Stapleton, Wm. J.
Starkey, Frank R.
Stephenson, Frank
Stevens, Rollin
Stiles, C. H.
Ulrich, Henry L.
Van Rhee, George
Varney, H. R.
Vreeland, C. Emerson
Watkins, John T.
Wendt, Leonard F. C.
Wilson, Walter J.

Flint

Burr, C. B.
Clift, M. Wm.
Knapp, M. S.
Marshall, William H.
Morrish, Ray S.

Grand Rapids

Baker, Abel J.
Corbus, Burton R.
Gordon, T. D.
Irwin, Thomas C.
Johnston, Collins H.
Meengs, J. B.
Moore, Vernon
Northrup, Wm.
Wells, M.

Granville

Brook, J. D.

Hancock

Fischer, Arthur F.

Kalamazoo

Bliss, Guy L.
Crane, A. W.
Jackson, John B.

MICHIGAN—*Continued*

Lansing
Holm, M. L.
Olin, Richard M.

Papeer
Kay, W. J.

Monroe
Southworth, Chas.

Munising
Trueman, G. A.

MINNESOTA

Duluth
Linneman, N. L.
Martin, T. R.
Rowe, Olin W.
Scherer, C. A.
Tuohy, E. L.

Minneapolis
Avery, J. Fowler
Beard, Archie
Crafts, Leo M.
Drake, Charles
Gardner, Edward L.
Head, George Douglas
Henry, Clifford E.
Morrison, A. W.
Peppard, Thomas Albert
Rizer, Robert I.
Robertson, H. E.
Schlutz, Frederick W.
Schneider, John P.
Ulrich, Henry L.

Rochester
Hartman, Howard R.
MacCarthy, Wm. C.

St. Paul
Burns, Robert M.
Gager, Edward C.
Greene, Charles Lyman
Hall, Alexander
Hoff, Peder A.
Lepak, John A.

MISSOURI

Columbia
Stine, Dan G.

Kansas City
Bohan, P. T.
Duke, Wm. W.

Kansas City—Continued
Fassett, Charles W.
Hamilton, Hugh D.
Holbrook, Ralph
Hoxie, George H.
Lynch, L. A.
McPherson, Owen P.
Milne, Lindsay S.
Murphy, Franklin E.
Myers, Wilson A.
Wolfe, I. J.

St. Joseph
Bell, John M.

St. Louis
Baumgarten, Walter
Brady, Jules M.
Butler, L. P.
Clemens, J. R.
Engelbach, William
Falk, O. P. J.
Hughes, Marc Ray
Ives, George
Lyter, J. Curtis
MacFadden, James F.
Neilson, Charles Hugh
Smith, Elsworth
Zahorsky, John

MONTANA

Helena
Fligman, Louis L.

Livingston
Pampel, B. L.

Miles City
Brown, George E.

NEBRASKA

Lincoln
Mayhew, John Mills
Smith, Arthur L.

Norfolk
Barry, Augustus C.
Foster, Robert A.
Pollack, Fredolph

Omaha
Ballard, C. H.
Bliss, Rodney W.
Christie, B. W.
Clarke, Floyd
Coulter, F. E.

Omaha—Continued
Crummer, Leroy
Dunn, A. D.
McClanahan, H. M.
Milroy, Wm. F.
Riley, Bryan
Sachs, Adolph
Tyler, Albert F.

NEW JERSEY

Atlantic City
Alsop, Thomas
Jonah, William E.
Stewart, W. Blair

Elizabeth
Stern, Arthur

Glen Ridge
Wallace, Henry

Greystone Park
Donnet, John Victor
Fisher, Ernest M.
Henschel, Louis K.
Thorne, Frederick H.

Hackensack
McFadden, G. Howard

Hoboken
Gelbach, Rudolph W.
Von Deeisten, Henry T.

Jersey City
Cassidy, John M.

Montclair
Mabey, John Corwin

Newark
Beling, C. C.
Bumsted, C. R.
Connolly, Richard
Dowd, Ambrose F.
Elliott, Daniel
Lowrey, James H.
Martland, Harrison
Steiner, Ed.
Teeter, Charles E.

Nutley
Whelan, Edward P.

Paterson
Surnamer, Isaac

Rockaway
Flagge, Frederick W.

NEW JERSEY—*Continued*

Secaucus
King, G. W.
Pollak, B. S.

Town of Union
Curtis, Grant P.

Trenton
McDonald, John O.

NEW YORK

Albany
Conway, F. C.
Cox, F. J.
Rooney, James F.

Auburn
Gerin, John

Bedford Hill
Stivelman, B.

Binghamton
Lape, George S.
Lappeus, John C. S.
Overton, W. S.

Brooklyn
Andersen, A. F. R.
Aten, William H.
Banowitch, Morris M.
Bartley, E. H.
Betz, Isidore
Blatteis, Simon R.
Block, Siegfried
Brockway, Robert O.
Brown, Samuel S.
Brush, Arthur C.
Bunker, Henry A.
Butler, Glentworth R.
Chapin, Edward
Clarke, Raymond
Collins, John J.
Cornwall, E. E.
Coughlin, Robert E.
Cross, Frank Bethel
Cruikshank, Wm. J.
Dattelbaum, M. J.
DeLorme, M. F.
DeYoanna, A.
Dobkin, Nicholas
Eastmond, Charles
Evans, George A.
Fairbairn, Henry A.
Fisher, Charles M.

Brooklyn—Continued
Forbes, George
Gordon, Murray B.
Gutman, J.
Hangarter, Andrew H.
Hoxsie, Edward H.
Hubbard, W. S.
Ives, Robert F.
Joachim, Henry
Kaudt, Hartwig
Kerr, LeGrand
Keyes, E. P.
Kingman, Robert
Klein, A.
Little, George F.
Louria, Leon
Ludlum, W. D.
Macumber, John L.
MacEvitt, James M.
Meagher, John F. W.
Moser, William
Moses, Henry Monroe
Nash, Philip I.
Northridge, Wm. A.
Parrish, Paul L.
Reque, P. A.
Smith, Archibald D.
Smith, Joseph E.
Somers, J. A.
Van Cott, J. M.
Wallace, Wesley H.
Warren, L. F.
Webster, Henry G.
Wheeler, Robert T.
Wolfer, Henry

Buffalo
Benedict, A. L.
Cohen, Bernard
Eckel, John L.
Gibson, Arthur R.
Jones, Allen A.
Kauffman, Lesser
Love, F. W.
Lytle, Albert T.
Patterson, Harold A.
Pryor, John H.
Rice, James Francis
Rochester, DeLancey
Russell, Nelson G.

Buffalo—Continued
Thoma, Fridolin
Ullman, Julius
Walsh, Thomas J.

Central Islip
Burns, Geoffrey Chas. H.
Reed, Ralph G.
Vaux, Chas. L.

Clifton Springs
Woodbury, Malcolm
Wright, Floyd
Winter, Henry Lyle

Elmhurst
Schweigart, Fred J.

Forest Hills
Chalmers, Thomas C.

Mt. McGregor
Houk, Horace John

Mt. Kisco
Curry, G. P. M.

New York City
Amster, J. Lewis
Baketel, H. Sheridan
Bassler, Anthony
Berg, Henry W.
Bieber, Joseph
Bishop, Ernest S.
Bishop, James
Bishop, Louis F.
Blumgarten, A. S.
Bovaird, David
Brooks, Harlow
Burr, Chauncey L.
Byrne, Joseph H.
Byrne, Joseph
Caille, Augustus
Carman, Albro R.
Coleman, Daniel S.
Cooke, Robert A.
Davis, E. Elbert
Diner, Jacob
Donovan, Daniel J.
Egan, Cornelius J.
Edson, David Orr
Eichler, Philip
Field, C. Everett
Fisch, Gustav Grant
Friedman, G. A.
Goodhart, S. Philip
Goodridge, Malcolm

New York City—Continued
Gottlieb, Charles
Greeff, J. G. Wm.
Grossman, Morris
Halpern, J.
Hatch, Leffingwell
Herrick, W. W.
Herrman, Charles
Hirsch, Isaac
Holland, Arthur L.
Hollis, A. Wm.
Hollister, Frank C.
Horowitz, Philip
Hunt, Edward L.
James, Walter B.
Jutte, Max Ernest
Katzenback, W. H.
Kraus, Walter Max
Laport, George L.
Levy, I. J.
LeWald, Leon T.
Lewi, Emily
Lewis, H. Edwin
Lieb, Clarence W.
McKendree, Chas. A.
McSweeney, E. S.
Maier, Otto
Mannheimer, George
Meltzer, Victor
Meuer, S. H.
Meyer, Alfred
Monae-Lesser, Mozart
Mooney, Louis M.
Nagle, James F.
Norman, M. Philip
Pease, Marshall C.
Pfeiffer, Felix
Philip, Carlin
Pumyea, P. C.
Quackenbos, H. F.
Quintard, Edward
Raminez, Max A.
Reilly, Thomas F.
Richardson, E. J.
Robinson, D.
Rothenberg, L. H.
Rottenberg, I. M.
Sachs, L. B.
Satterthwaite, Thos.
Schapira, S. Wm.

New York City—Continued
Schlapp, Max G.
Scott, George D.
Shelby, E. P.
Sheldon, Wm. H.
Sillo, Valdemar
Stark, M.
Stella, Antonio
Stewart, Wm. H.
Strodl, George T.
Sturtevant, Mills
Thom, Burton Peter
Titus, Edward C.
Turck, Fenton B.
Wachsmann, S.
Weber, Leonard G.
Weinstein, Julius W.
Weiss, Samuel
Welker, Franklin
Wilcox, R. W.
Wilson, George A.
Youngling, George S.

Niagara Falls
McBlaine, Thomas J.

Ogdensburg
Cooper, W. Grant

Poughkeepsie
Hill, Eben C.
Von Tiling, Johannes

Rochester
Button, Lucius L.
Darrow, Charles E.
Ewers, Wm. V.
Jackson, Edward W.
Lath, E. M.
Mulligan, Wesley T.
Sutter, C. Clyde
Swan, John M.
Williams, J. R.

Schenectady
Betts, Lester
Collie, Roy M.
Faust, Louis
Goddard, Walter W.
Ham, Stillman S.
Reed, Fred C.
Scott, J. M. W.
Stone, Warren B.
Vander, Bogart Frank

NEW YORK—*Continued*

Syracuse
Gould, L. A.
Kaufman, Franklin J.
Larkin, Albert E.
Levy, I. Harris
Loveland, B. C.
Reifenstein, Edw. C.
Wiseman, Joseph R.

Stapleton
Foster, Albert D.

Troy
Stillman, Edgar R.

Utica
Dill, George H.

Watkins
Ferris, Albert W.

NORTH CAROLINA

Charlotte
Munroe, John P.
Nisbit, Walter O.

Hoke County
McBrayer, L. B.

High Point
Hiatt, Houston B.

Raleigh
Anderson, Albert

NORTH DAKOTA

Bismarck
Arnson, Julius O.
Ruediger, Ernest Henry

Mandan
Altnow, H. O.

OHIO

Akron
Held, Charles E.

Cincinnati
Bettman, Henry Wald
Greiwe, John E.
Stix, Walter H.
Wendel, Henry C.

Columbus
Sheetz, John W.
Whitaker, H. W.

Cleveland
Berger, Samuel S.
Cummer, C. L.

Cleveland—Continued
Fliedner, G. B.
Philips, John
Stone, Charles W.
Stoner, Willard C.
Updegraff, Ralph K.

Marion
Young, Fillmore

Richwood
Roebuck, L. L.

Springfield
Syman, Louis L.

Steubenville
Bradley, John A.
Miller, J. E.

Toledo
Brown, N. Worth
Levisson, Louis A.
Salzman, Samuel
Tenney, C. F.
Waggoner, C. W.
Zbinden, Theodore

Warren
Manley, O. T.

Youngstown
Jones, E. Henry
Morrison, R. M.
Patrick, H. E.
Rosenblum, Alex. M.
Welch, H. E.

OKLAHOMA

Chickasha
Leeds, Alexander B.

Norman
Ellison, Gayfree

Oklahoma City
Andrews, Leila E.
Chase, A. B.
Fishman, C. J.
Moorman, L. J.
Riely, Leander A.
White, Arthur W.

OREGON

Portland
Baar, Gustav
Brill, I. C.

Portland—Continued
Koehler, George F.
Matson, Ralph C.
Selling, Lawrence

PENNSYLVANIA

Allentown
Beck, Foster A.
Ashland
Biddle, Robert
Chester
Wood, John Wm.
Clerk's Summit
Imhoff, Wm. H. M.
Corry
Christie, A. C.
Donora
Lewis, Wm. H.
Germantown
Kelly, T. C.
Johnstown
Stewart, H. M.
Norristown
Christian, T. B.
Oil City
McLain, Paul J.
Philadelphia
Allyn, Herman
Anders, James
Beardsley, Ed.
Bernstein, Ralph
Daland, Judson
Dercum, F. X.
Dickinson, H. S.
Gordon, Alfred
Loewenburg, S. A.
Mills, H. B.
Musser, John H. J.
Oliensis, A. E.
Reeves, Rufus S.
Rehfuss, M. E.
Robertson, Wm. E.
Roussel, Albert
Sajous, Charles E. deM.
Smith, Ernest B.
Stewart, F. E.
Warmuth, M. P.
Pittsburgh
Alexander, J. Hope
Barach, Jos. H.
Pittsburg—Continued
Berg, G. F.
Billings, F. T.
Gardner, E. R.
George, S.
Grayson, Thomas W.
Grier, George W.
Haythorn, Sam
Hollander, Lester
Hood, Robert T.
Johnston, G. C.
Johnston, J. I.
Jones, Clement R.
Lichty, John A.
Litchfield, L.
Mayer, Ed. E.
Mayer, W. H.
McCready, E. B.
McKelvey, J. P.
Mercur, Wm. H.
Ohail, J. C.
Palmer, G. A.
Pettit, Albert
Schwartz, L. L.
Sherrill, A. W.
Shilen, J.
Simonton, T. A.
Thorne, J. M.
Utley, F. B.
Westervelt, H. C.
Wolf, Jacob
Zeedick, Peter I.
Zugsmith, Edwin
Reading
Bertolet, Wm. S.
Republic
Kimmel, W. S.
South Bethlehem
Butler, Thomas
Uniontown
Smith, Charles H.
Vandergrift
Speer, Ross H.
Washington
Sargent, L. D.
Wilkes-Barre
Collins, Daniel W.
Kaufman, Albert

PENNSYLVANIA—*Continued*

York
Comroe, Julius H.
Holtzapple, G. E.

RHODE ISLAND

Providence
Farnell, Frederick J.

SOUTH CAROLINA

Florence
Barnwell, John M.

SOUTH DAKOTA

Java
Rosenthal, Sigmond

TENNESSEE

Knoxville
Bowen, William
Memphis
Bosworth, Robinson
Cullings, Jesse J.
Fontaine, Bryce W.
Krauss, Wm.
Jones, Frank A.
Leroy, Louis
McElroy, J. B.
Rudner, Henry G.
Swink, Walter T.
Warr, Otis
Nashville
Dunklin, F. B.
Witherspoon, John A.

TEXAS

Dallas
Calvert, W. J.
Galveston
Chapman, L. E.
Graves, M. L.
Levy, Moise D.
Stone, C. S.
Houston
Agnew, James H.
Finsand, Victor
Waples, F. A.
Temple
Gober, O. F.

TEXAS—*Continued*

Waco
Colgin, M. W.

UTAH

Salt Lake City
Cochran, Geo. A.
Gibson, Catlett T.
Rich, Wm. L.
Richards, G. G.
Silver, Edw. V.

VERMONT

Battleborough
Lane, Wilfred H.
Burlington
Beecher, Clarence Henry

VIRGINIA

Charlottesville
Davis, John Staige
Norfolk
Grandy, Charles R.
Silvester, Willis Wilson
Richmond
Gray, Alfred L.
Hodges, Fred M.
Hodges, J. Allison
Houser, A. A.
Hutcheson, J. M.
McGuire, Edward
Shipard, Wm. A.
Tucker, Beverly R.
VanderHoof, Douglas

WASHINGTON

Seattle
Blackford, J. M.
Heussy, William C.
Stith, Robert M.
Tacoma
Brown, J. R.
Wilson, C. Stuart

WEST VIRGINIA

Clarksburg
Cherry, Solomon
Shuttleworth, B. F.
Huntington
Vest, Walter E.

WISCONSIN

Barron
Post, C. C.
Fond du Lac
Calvy, P. J.
Layton, Oliver M.
Madison
Blankinship, Ray C.
Carter, Homer M.
Fahr, Geo. Elveston
Marshfield
Milbee, H. H.
Turgasen, F. E.
Milwaukee
Henes, Edwin
Jermain, Louis
McJunkin, Frank A.
Patek, Arthur J.
Warfield, Louis M.
Oshkosh
Andrews, Neil
Werner, O. E.

WYOMING

Evanston
Thompson, A. P.

CANADA

Brandon, Man.
Carter, L. J.
Fredericton, N. B.
Van Wart, George Clowes

CANADA—*Continued*

London, Ont.
Crane, James W.
Ferguson, J. I.
Fischner, S. M.
Hale, George C.
Hughes, F.
Lindsay, John C.
MacGregor, John A.
Montreal, Quebec
Benoit, Em. P.
Shedden, Ontario
Aitkin, G. W. A.
Toronto, Ontario
Elliott, J. H.
Loudon, J. D.
McPhedran, J. H.
Minns, F.
Winnipeg, Man.
Burridge, A. J.
Chestnut, William
Cadham, F. T.
Gilmour, C. R.
Hunter, Charles
Mathers, Alvin T.
Mackay, Hugh
McMillan, J. Currie
Montgomery, E. W.
Moody, Arthur W.
Murdoff, H. M.
Rogers, William
Young, Fred A.

OFFICERS ELECTED AT THE BALTIMORE SESSION OF THE AMERICAN CONGRESS ON INTERNAL MEDICINE, FEBRUARY 21ST TO 25TH, 1921

FOR THE AMERICAN CONGRESS ON INTERNAL MEDICINE

President—Dr. Sydney R. Miller, Baltimore, Md.
Assistant Professor of Medicine, The Johns Hopkins University.

Vice-President—Dr. Ellsworth S. Smith, St. Louis, Mo.
Professor of Medicine, Washington University.

Second-Vice-President—Dr. James Rae Arneill, Denver, Colo.
Professor of Clinical Medicine, University of Colorado.

Secretary-General—Dr. Frank Smithies, Chicago, Illinois.
Associate Professor of Medicine, University of Illinois.

Treasurer—Dr. Clement R. Jones, Pittsburgh, Pa.
Lecturer in Medicine, University of Pittsburgh.

FOR THE AMERICAN COLLEGE OF PHYSICIANS

President—Dr. James M. Anders, Philadelphia, Pa.
Professor of Clinical Medicine, Graduate School, University of Pennsylvania.

Vice-President—Dr. Frederick Tice, Chicago, Illinois.
Professor of Medicine, University of Illinois.

Second Vice-President—Dr. C. C. Bass, New Orleans, La. (Provisional)
Professor of Research Medicine, Tulane University.

Secretary-General—Dr. Frank Smithies, Chicago, Illinois.
Associate Professor of Medicine, University of Illinois.

Associate Secretary-General—Dr. Joseph H. Byrne, New York City, N. Y. (Provisional)

Treasurer—Dr. Clement R. Jones, Pittsburgh, Pa.
Lecturer in Medicine, University of Pittsburgh.

Each Application must be accompanied with the Annual Dues, $5.00

Make checks payable to the American Congress on Internal Medicine.

APPLICATION FOR MEMBERSHIP
IN
The American Congress on Internal Medicine

.....1921

The undersigned desires to become a member of The American Congress on Internal Medicine, and encloses five dollars, dues for the current year.

I am a graduate of.....year.....

I am licensed to practice medicine in.....

My practice is mainly limited to.....

I am a member in good standing of the following Medical Societies.....

.....

Signed.....

P. O. Address.....

City.....

State.....

Return this application properly completed to Dr. Frank Smithies, Gneral, 1002 N. Dearborn Street, Chicago, Ill. If application is not accepted Council of The American Congress on Internal Medicine, notice will be given and fee for dues refunded.

No physician is eligible to membership in the American College of Physicians, unless he be a member in good standing of the American Congress on Internal Medicine

REQUIREMENTS FOR ADMISSION TO
The American Congress on Internal Medicine

1. Applicant must be a graduate of a Medical School of first rank.
2. He must be a member in good standing in his local, State or National Societies.
3. He must be a licentiate for practice in the State in which he resides or if not a licentiate, engaged in practice or in scientific research in a hospital or institution of generally recognized standing.
4. His personal and professional conduct shall be such as become a gentleman and a member of a learned profession.
5. He shall make application for membership in the American Congress on Internal Medicine on its official form, sign and submit it with the annual fee, for the decision of the Councilors of the Congress. If the request for membership is not accepted by the Councilors, the applicant shall be so notified and the fee returned.
6. Applications for membership, properly completed, shall be sent to Dr. Frank Smithies, Secretary-General, 1010 N. Dearborn St., Chicago, Ill., or to Dr. J. H. Byrne, Associate Secretary-General, 167 West 76th St., New York City.

Each application must be accompanied by Initiation Fee of $25.00.

The American College of Physicians

Application for Fellowship

To the Officers and Councilors of the American College of Physicians:

I, the undersigned, a member in good standing of the American Congress on Internal Medicine, submit herewith the following brief sketch of my life, studies and practical work for your consideration in my application for fellowship in The American College of Physicians.

(1) I was born at .

received my preliminary education at (name different institutions)

received my college education at , my academic

degree (if any) at

(2) I received my medical education at

during the sessions of (specify) , and

received my degree of Doctor of Medicine from (name institution)

, in the year . I am

licensed to practice medicine in the State of .

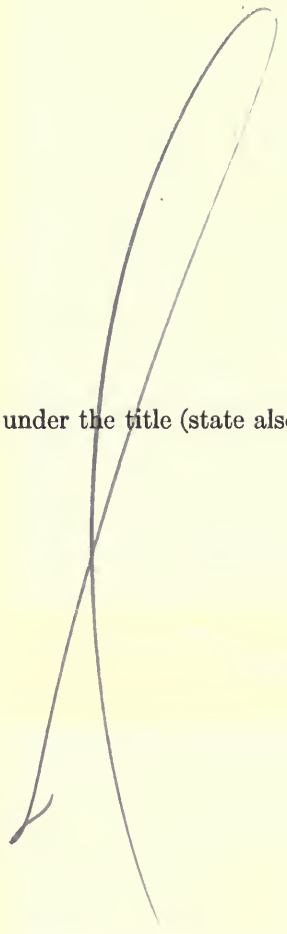
(3) I have devoted myself to the practice of Internal Medicine since

. During this period I was connected as Internist (this includes also Neurology, Pediatrics, Roentgenology, Pathology and Laboratory Sciences in general) with the following institutions (state in what capacity):

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(8) I am a practitioner in good standing, opposed to so-called fee-splitting in any form, and of conduct unbecoming a gentleman of a learned profession.

(9) I held office in the following medical societies (state as what):

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NOTE:—This application can be considered only provided applicant is a member in good standing of The American Congress on Internal Medicine. When completed this application should be sent with fee of $25.00 to Dr. Frank Smithies, Secretary-General, 1002 N. Dearborn Street, Chicago, Ill., or Dr. J. H. Byrne, Associate Secretary-General, 167 West 76th Street, New York City, N. Y.

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PRESIDENTIAL ADDRESS

DELIVERED BEFORE THE AMERICAN CONGRESS ON INTERNAL MEDICINE, FEB. 23, 1921, AT OSLER HALL, BALTIMORE, MD.

BY GLENTWORTH R. BUTLER, M.D., F.A.C.P.,

Brooklyn, N. Y.

THE Constitution of this Congress prescribes a presidential address. Fortunately there is no prescription as to its length, and the formal requirement will be met by a few words which seem desirable and necessary.

(1) This Congress is now a lusty infant, five years of age. In that time it has grown from nothing to 1100 pounds. It has at present a full outfit of endocrines and an ample supply of fat and water soluble A, B, C, and the rest of the alphabet as required.

To point a moral and adorn a tale it is felt by some of us that this rapid growth—and it bids fair to continue at the same rate—may result in acromegaly. There must necessarily be a limit to the number which can be accommodated in hospitals and clinics. It may, therefore, be necessary—and the time may not be very far away—to restrict the membership in some fashion. All the clinics in which the attendance is limited, by space or by the character of the subject, have been oversubscribed, and some are to be repeated. There is still room, but not much, in the large amphitheatre clinics. I venture to suggest to those who like the Congress and its aims that they will be playing the part of the wise to get in while the getting in is good.

(2) The object of the Congress is simple, uncomplicated, and without guile. I speak the absolute truth when I say that the only aim of the Congress, and the sole reason for its existence, is to hold its annual clinical week in some great medical center. A week of this sort means that we see the men whom we know by reputation, whose accomplishments in medicine we admire and value, at work in their accustomed workshops. The personal touch and personal observation of the highly trained clinician and research worker is of inestimable value. It is a strong and direct stimulus to our own efforts in the practice of modern medicine.

(3) Some queries have been made as to why we hold our sessions in February. It is objected that everyone in the profession is especially busy at this season. This is perfectly true, and this is the precise reason why the session occurs at this time. Hospitals, schools, laboratories and their personnel are at the high tide of their activities, and this is exactly the time at which we want to see them. Moreover, the members of the Congress who come from all over the continent to the session are equally active in their own circles. The very fact that they make considerable sacrifices to be present at this session is an index of the value they place upon the opportunities offered. As a matter of interest we find that those who come to the clinical week are, as a rule, the medical leaders of their home communities. All of which speaks for itself.

(4) Judging from present indications, medicine, as distinguished from surgery, is destined to great progress in the years to

come. Not only in diagnosis and therapeutics, but in the prevention of disease, advances are in progress which will materially diminish morbidity and mortality. As guardians of the public health we hope and believe that an annual survey of his or her bodily condition, in the interest of well-being and efficiency, will be considered a duty of the individual.

(5) It is my duty—and pleasure—to extend the warm thanks of the Congress to those of the Baltimore profession who have made our visit a delight and an inspiration. Among so many who have coöperated for our benefit, it would be invidious to mention names, but I wish to thank especially the official heads of the Medical Departments of Johns Hopkins University and of the University of Maryland. You all know to whom I refer. The General and Special Baltimore Committees have worked out the complicated details of the week in a most admirable fashion. The warm thanks of the Congress go to them.

COMMENTS ON TETANY*

BY LEWELLYS F. BARKER, M.D.

BALTIMORE.

OF the several maladies now believed to be due to disorders of internal secretion, that known as tetany, which can develop when the parathyroid glands are removed or are injured beyond a certain degree, has been studied perhaps as carefully as any, and knowledge regarding this disorder and its endocrine relationships has, up to recent times, been looked upon as particularly clean-cut and well-established. That the tetany that followed operations for goiter (*tetania strumipriva*) is due to parathyroid removal or parathyroid injury rather than to thyroid removal or thyroid injury, has certainly been definitely demonstrated. The bringing of the proof that tetany can result from parathyroid insufficiency is an important scientific fact, but the establishment of this fact must be looked upon merely as a pioneer step in the elucidation of the pathogenesis of tetany. It is a fact that simply whets the mind to sharpness for further exploration of the chain of events intervening between loss of parathyroid function and the manifestation of the tetany symptoms. Moreover, since we must assume the existence of such an intermediate chain of events, one wonders whether or not there may be conditions other than hypoparathyroidism that may become linked up with a part of this chain and thus become causes of tetany. Fascinating as it has been to entertain a unitary conception of the pathogenesis of tetany in hypoparathyroidism, it must be admitted that such a unitary conception is as yet purely theoretical and that a plurality of causes is a possibility yet to be refuted. Indeed those who support the unitary conception freely admit that multiple causes can lead to hypoparathyroidism, though they assume that from the hypoparathyroid stage on there is pathogenetic unity. It is thinkable, however, that unity of pathogenicity may start lower down in the scale of events, nearer to the end manifestations than has hitherto been assumed. On account of the great clinical interest of the manifestations of tetany, the author thought that some comment upon the older and newer studies bearing upon the subject might be of interest at this meeting.

*Remarks made by invitation before the American Congress on Internal Medicine, Baltimore Meeting, Feb. 25, 1921.

MANIFEST TETANY AND LATENT TETANY

Spontaneous attacks of intermittent tonic spasm in certain groups of muscles (*manifest tetany*), though not so very frequently

seen, are still common enough in occurrence to be familiar to every working internist. We used to meet with tetany frequently after goiter operations, but now that surgeons have learned how to protect the parathyroids when operating for Graves' disease or other forms of goiter, it is relatively seldom that we see *tetania strumipriva*. Postoperative tetany does, however, still occur even when the operations are done by competent surgeons, especially in cases in which the parathyroids have been involved in neoplastic or in inflammatory disease, or when there has been unavoidable injury to the parathyroid glands themselves or to their blood supply at an operation, or when postoperative infection has occurred. Manifest tetany is also still occasionally encountered in association with certain gastro-intestinal disturbances (*tetania gastrica*), in association with pregnancy or the puerperal period (*tetania gravidarum, tetania lactantium*), and in association with the so-called spasmophile diathesis in children (*tetania infantum, tetania puerorum*). The *idiopathic tetany* of workmen, so common in epidemic form at certain seasons of the year in particular cities in Europe (Vienna, Heidelberg), is certainly uncommon in America.

Latent tetany, that is tetany in which spontaneous attacks of tonic spasm do not occur, is much more common than is generally supposed. Not only is it demonstrable in many patients for long periods after they have suffered spontaneous attacks, but careful clinical examination will often reveal its presence in patients who give no history whatever of manifest tetany. It is therefore well worth while, I think, when making routine diagnostic surveys, to determine the presence or absence of signs of latent tetany. The necessary tests can be made in a few moments, for, if the Chvostek phenomenon, the Trousseau phenomenon, and the arm phenomenon of Poole are negative, and if the signs of chronic tetany (defects in the enamel of the teeth, perinuclear cataracts, dystrophies of the hair and nails, recurring conjunctivitis) are absent, one can be fairly sure that there is no latent tetany. The crucial test, however, for the presence of tetany lies in the determination of the galvanic excitability of the motor nerves. This test, too, can be very quickly applied either in the adult or in the child if an electrical apparatus be at hand. Particularly in children is the measurement of the galvanic excitability of the motor nerves by means of the technic standardized by von Pirquet important, and it is wise to make the test in all children who show any convulsive tendency (general seizures, laryngospasm, carpopedal spasm, etc.). If muscular contractions result from the application of galvanic currents below the limit of 5 milliampères on either cathodal opening or anodal opening, one can be sure that hyperexcitability exists.

The Hyperexcitability of the Nervous System in Tetany

The easily observable clinical phenomena in both manifest and latent tetany depend upon hyperexcitability of the nervous system. Thus the hyperkinesis of certain groups of voluntary muscles met with in manifest tetany is always associated with increased excitability of the motor nervous system. Between spontaneous attacks in manifest tetany and in the absence of attacks in latent tetany, mechanical stimuli and electrical stimuli applied to the motor nerves will call forth characteristic contractions which are not elicitable in health when stimuli of the same strength are applied. Just what the neural mechanisms are that determine the peculiar forms of tonic spasm in tetany is as yet a riddle, for the demonstrated hyperexcitability of the peripheral motor neurons does not fully solve it. A certain election by the tetany-producing influence of particular nervous mechanisms has to be assumed, for otherwise we should not see constantly recurring these tonic spasms in definite domains, giving rise to such peculiar attitudes as the obstetrical hand and typical pedal spasm. Interesting problems of localization suggest themselves for the investigating neurologist in connec-

tion with tetany, for we have yet to determine whether the peculiar predominances of tonus which we meet with in tetany are referable to one or another of the various tonus-producing mechanisms with which we are gradually becoming acquainted.

That the pathological influence in tetany is not exerted solely upon the tonus-producing apparatus of the motor nervous system has been shown by observations upon the sensory nervous system and upon the autonomic nervous system in the disease. Thus the pains and paresthesias of manifest tetany have long been known, and Hoffmann early proved that the peripheral sensory nerves show an increased excitability to electrical stimulation in tetany. And similar observations have been made for the nerves of special sense, especially for the acoustic nerves. More recently, the hyperexcitability of the autonomic nervous system in tetany has attracted attention. We have been made familiar, for instance, with spasmodic contractions of the smooth muscle and of the heart muscle in certain cases of tetany (Ibrahim). Sphincter spasm, bronchospasm and probably heart muscle spasm may occur. Moreover, the vasodilator and vasoconstrictor nerves are sometimes demonstrably hyperexcitable to mechanical stimuli in tetany, and certain pharmacodynamic tests (epinephrin, pilocarpin) reveal the existence also of an increased chemical excitability of the autonomic nerves in certain cases of tetany (Elliot, Falta and others).

Intermediary Metabolism in Tetany

Notable efforts have been made in recent years, through studies of the intermediary metabolism and of mineral metabolism, to determine what substance (hypothetical tetany poison) acts upon the nervous system to make it hyperexcitable, and how it is that in hypoparathyroidism and in other conditions in which tetany occurs, this substance is permitted to accumulate in poisonous amounts. Among the more interesting of the studies in this connection are those dealing with calcium, magnesium, potassium and sodium metabolism, those dealing with the acid-base equilibrium, those dealing with the metabolism of guanidin and guanidin derivatives, and those dealing with substances directly produced by the parathyroid glands and by the thymus gland. Besides such studies there have been a whole series of investigations upon protein, carbohydrate, fat and purin metabolism in tetany, but to these I shall not at this time refer.

Following the earlier fundamental physiological researches by Loeb, Sabbatini, and J. B. MacCallum on the effects of certain cations upon neuro-muscular excitability, much attention has been paid both in this country and abroad to mineral metabolism in tetany. Calcium and magnesium ions are demonstrably sedative, and potassium and sodium ions demonstrably irritative in their effect upon the nervous system and the musculature.

As early as 1905, Quest had found that the brains of spasmophilic children are deficient in calcium. Silvestri, in the following year, advanced the hypothesis that tetany and spasmophilia may be due to hypocalcification of the nerve-centers. He also called attention to the fact that many of the conditions like persistent diarrhea, lactation and certain intoxications with which tetany may be associated, tend to lower the calcium content of the body. The intimate relationship of the tetany of childhood to rickets further excited interest in the relationship of both of these diseases to calcium metabolism.

General interest in calcium metabolism in tetany was, however, first aroused by the researches of MacCallum and Voegtlin (1909). On reviewing the facts in the bibliography and surveying the results of their own studies these investigators concluded: (1) that the hyperexcitability of the nervous system in tetany is due to the withdrawal of calcium from the nerve-cells and (2) that this hyperexcitability can be made to disappear by the administration of calcium.

After the publication of their important paper, many interesting researches upon

calcium metabolism in human and in experimental tetany were undertaken in this country and abroad. The studies of J. V. Cooke, of Hoskins and Gerstenberger, of MacCallum and Vogel, of Marine, and of Bergheim, Stewart and Hawk—to mention some of the American investigators only—are all interesting in this connection. Summarizing the results of these studies very briefly, it may be said that the consensus of opinion has favored the view that when there is parathyroid insufficiency, an acidosis develops, and that this acidosis accounts for the withdrawal of calcium and magnesium from the nerve-cells.

Clinical studies have shown that the administration of calcium salts will ameliorate the symptoms of tetany, probably through their sedative influence upon the nerve-cells themselves. The actual cure of tetany when it occurs seems to depend upon the gradual restoration of normal metabolic conditions and upon recuperation of the parathyroid glands, rather than upon the influence of administered calcium.

Very recently, it has been shown that tetany is not always associated with acidosis but that it may, on the contrary, be associated sometimes with alkalosis (Collip and Backus, Grant and Goldman). Tetany has even been known to follow speedily upon the therapeutic intravenous administration of sodium bicarbonate. When alkalosis exists, the total calcium content of the blood may be increased rather than diminished though it is possible that the active calcium is in reality diminished (Grant and Goldman). For the present, it must be concluded that disturbances of the acid-base equilibrium in either of the two directions—toward acidosis or toward alkalosis—may be associated with tetany and that in both conditions the calcium metabolism is disturbed. A number of other interesting metabolic problems in connection with the occurrence of tetany have recently excited interest. Thus, in how far the diminution of phosphoric acid secretion observed by Greenwald and by Schabad in tetany is related to the disturbance of the acid-base equilibrium and of the calcium metabolism, is a problem that merits study. Studies of water metabolism and of sodium chlorid metabolism in tetany also deserves further investigation, since the Toronto clinicians, Allan Brown and Almon Fletcher, have shown that infants suffering from tetany tend to improve as soon as diuresis has set in and constipation has been overcome. It has long been known that the so-called "water babies" are especially predisposed to spasmophilia and to tetany.

Comparatively recently, the possibility of a relationship of tetany to intoxication by xanthin on the one hand, or by guanidin bodies, on the other, has been considered. Thus Berkley and Beebe have attempted to control the convulsions of xanthin intoxication by administration of calcium in order to see if the same favorable effects were produced as in tetany. They found that the toxic effects of xanthin are easily controlled by intravenous injections of calcium and strontium salts. Now xanthin contains a guanidin group, and Koch, in this country, and Paton and his collaborators, in England, have brought evidence of the existence of a guanidino-body intoxication in tetany. It has been suggested that xanthin intoxication and guanidino-body intoxication may depend upon the lack of transforming ferments for these substances, due in turn to insufficiency of the parathyroid glands. Thus far, however, no proof has been brought that the parathyroid glands manufacture ferments that possess this transforming function.

That tetany may be due to thymus intoxication is another theory recently advanced by Uhlenhuth of the Rockefeller Institute. His experiments, conducted upon the larvæ of *Amblystoma,* have convinced him that an antagonism exists between the function of the parathyroids and that of the thymus gland; where there is insufficiency of the parathyroids, a thymus intoxication can, he asserts, give rise to tetany. Transferring the results of his experimental studies to human beings, Uhlenhuth suggests that the frequency of tetany in children may be due to the lively activity of the thymus during

the developmental period, and he even assumes that the tetany of pregnancy may be due to thymus intoxication of the mother from the fetus!

Tetany and Hyperpnea

Physiologists working with forced respiration had observed several times a stiffening of the muscles during their experiments, but it was not until last year (1920) that Collip and Backus of Canada, and Grant and Goldman of St. Louis recognized that this muscular rigidity was in reality to be looked upon as the occurrence of tetany during forced respiration. The latter observers were able to produce definite attacks of spontaneous tetany in their own persons by prolonged forced respiration, during which engagement alkalosis of the blood develops, there is diminished output of ammonia in the urine, and the calcium content of the blood is increased. These experiments have an important bearing upon the relation of tetany to acid-base equilibrium to which I have already referred.

During the present year (1921), my associate, Dr. Thomas P. Sprunt, and I have had opportunity to observe an attack of spontaneous tetany occurring in a young man during a paroxysm of hyperpnea accompanying a functional nervous state that followed an encephalitis lethargica. The young man was lying upon the examining table in my office and had for some little time been in a paroxysm of hyperpnea, the respiration rate being slowed and the single respirations being very deep. As I went to examine him both upper extremities went into tonic spasm and he exhibited a typical tetany attack. We were able to photograph the patient at the time. This is, as far as I know, the first observation of spontaneous tetany occurring during the hyperpnea of disease. It will be interesting from now on to look for manifestations of tetany in other pathological hyperpneas, such as the large breathing of Kussmaul in diabetes. Even when spontaneous tetany fails to appear in pathological hyperpnea, it will be interesting to test the galvanic excitability of the motor nerves to see whether or not latent tetany can be demonstrated to exist.

Treatment of Tetany

The knowledge that physicians have gradually accumulated regarding the conditions under which tetany occurs will go far from now on to help us in the prevention of tetany.

In childhood, especially, suitable dietetic measures and hygienic surroundings will do much to prevent rickets, spasmophilia, and infantile tetany.

In adults, the control of intoxications and of infections, especial care during pregnancy and the lactating period, the prevention or treatment of gastro-intestinal disorders, as well as attention to posture in persons engaged in certain sedentary occupations (tailoring, shoemaking, carpentry, sewing), should be found helpful as prophylactic measures.

Tetany after strumectomy, though perhaps not entirely preventable, will be reduced to minimal occurrence through avoidance of removal of, or injury to the parathyroid glands and through careful preservation of their blood supply by surgeons at operation.

The prevention of tetany is exceedingly important, for those who have once had tetany are very prone to show trophic or neural disturbances of one sort or another in after life. Thus, it is now well-known that premature cataract, epilepsy and certain psychoses are especially common in persons who have had tetany in childhood. Moreover, the tetany of adults must often be looked upon, I believe, as a recurrence of a disease that has existed earlier in life.

The treatment of tetany, once the disorder has become manifest is far less satisfactory than we could wish. The administration of calcium salts or of substances derived from the parathyroid glands will, it is true, ameliorate the symptoms in most cases, and will sometimes tide the patient over until Nature brings about a real cure through readjustment of the metabolism or

through restoration of the function of the parathyroids. In the severer cases, however, and especially in *tetania strumipriva* tetany is often fatal. In these severer forms of tetany it is possible that cure may result from transplantation of one or more parathyroid glands. But the application of this therapy by organ-transplantation is fraught with almost insuperable difficulties. Grafts from animals into human beings do not take and it will only occasionally be possible to secure human donors. Such organ-transplantation from one human being to another has been successfully performed in at least four or five cases. But when it is recalled that the removal of a single parathyroid gland from a human being may be followed by postoperative tetany, the danger to the donor will be easily grasped. The gift of a living parathyroid gland will make demands upon heroism that will exceed the capacities of most persons.

STUDIES OF INFANT FEEDING. XII.

A STUDY OF THE AMOUNTS OF THE INDIVIDUAL MINERAL ELEMENTS USUALLY FED IN MODIFIED MILK FORMULAE, WITH A CONSIDERATION OF THE USE OF LIME WATER IN CONNECTION THEREWITH

BY ALFRED W. BOSWORTH, M.D.

The Boston Floating Hospital Laboratories,

Boston, Mass.

COMPOSITION of Human Milk and Cow's Milk.—Milk is often spoken of as a food containing all substances required for growth. This may be represented diagramatically as follows:

MILK
- Water
- Fat
 - Glycerids of fatty acids
 - Lecithin
 - Cholesterin
- Sugar
- Nitrogenous Compounds
 - Albumin
 - Casein
 - Other nitrogenous compounds
- Salts
 - Organic
 - Inorganic—ash
- Vitamins

in true solution, in colloidal solution, in suspension, and in the form of an emulsion. The conditions in which the different components of milk are carried in the water are shown in Table I.

The composition of milk will vary with the species and with individuals of the same species. The average composition of the two milks with which we are concerned is shown in Table II.

Breast milk is nature's food for the infant, and we may consider the constituents to be so balanced as to meet all the demands of growth, with a minimum of waste. Cow's milk, on the other hand, is nature's food for the offspring of the cow, and is not balanced in any respects as a food for infants, and its use as such must usually be preceded by some form of modification. If the differ-

Table I.

Condition in Which the Milk Components Are Present in the Water of Milk[1].

1. Milk constituents in true solution in milk serum:	2. Milk constituents partly in solution and partly in suspension or in colloidal solution:	3. Milk constituents entirely in suspension or in colloidal solution:
(*a*) Sugar	(*a*) Albumin	(*a*) Fat
(*b*) Citric Acid	(*b*) Inorganic phosphate	(*b*) Casein
(*c*) Potassium	(*c*) Calcium	(*c*) Vitamins
(*d*) Sodium	(*d*) Magnesium	
(*e*) Chlorin		
(*f*) Iron		
(*g*) Zinc (?)		
(*h*) Vitamins		

Chemically, milk may be considered as water carrying a mixture of food substances, these substances being present in the water, ences shown in Table II were the only ones confronting us in the problem of properly modifying cow's milk for infant feeding.

many of the formulas now in use should serve the purpose very well, for it is very easy to modify cow's milk in such a manner as to give a mixture which will contain the amounts of fat, sugar, protein and ash found in human milk. There are other differences, more deep-seated and obscure, however, comprehensive consideration of which may be far-reaching in practical application, when they are more fully understood.

TABLE II.

AVERAGE COMPOSITION OF HUMAN MILK AND COW'S MILK[2].

	Cow's Milk Per Cent	*Human Milk* Per Cent
Fat	3.90	3.30
Milk-sugar	4.90	6.50
Proteins (combined with calcium)	3.20	1.50
Salts	0.90	0.31

The Calcium and Phosphorus Content of Cow's Milk and Breast Milk.—Cow's milk, nature's food for the offspring of the cow, contains inorganic constituents in sufficient amounts to supply the demands of the rapid growth and development of this animal and is especially rich in calcium and phosphorus, substances which the young of the cow uses to develop a rapidly growing bone tissue, but which the infant uses very sparingly. When fed to infants in the proportions in cow's milk or modified cow's milk, calcium and phorphorus are generally greatly in excess of the amounts required to supply the demands of the infant.

The ingestion of calcium greatly in excess of the requirements of the infant neccssitates the elimination of the excess either in the urine or the feces. In this connection it is a noteworthy fact that notwithstanding the high calcium content of cow's milk the calcium metabolism of bottle-fed infants, as measured by the calcium eliminated in the urine, is seldom greater, and often less, than found in the breast-fed infants, for it has been shown in previous papers that the calcium may be eliminated in the feces as calcium phosphate[4] and insoluble calcium soaps[5]. This mode of eliminating the excess calcium present in cow's milk, is in one way a protection to the infant, in that it prevents the calcium from entering the body fluids and tissues in organic combinations in such a way as to enter into the general metabolism process going on within the body; this would utilize the organic part of the salt and leave the calcium to be eliminated by the kidneys, a process which may be accomplished with some difficulty by the infant and may result in an excessive retention of calcium to such an extent that a toxic condition may be induced[5]; on the other hand the formation of the insoluble soaps in the intestines may be an important cause for much of the constipation met with in bottle-fed infants, or it may bring about other nutritional disturbances.

If we take into consideration the excess of calcium and phosphorus and so modify cow's milk as to reduce these substances to the amounts required by the infants, the ordinary methods now in use for such modifications will deprive the infant of the required amounts of other mineral elements.

This phase of the feeding problem demands more consideration than has been given to it in the past and more care must be taken to see that the mineral elements are more properly balanced.

The Salts of Milk.—It has been the general practice to consider the quantity of mineral elements present in milk to be represented by the ash, and figures obtained by the analysis of such an ash have been quite generally accepted. Such an analysis does not, however, represent the true mineral content of milk, for under the conditions ordinarily surrounding the determination of ash, some of the phosphorus in the protein molecule will be lost by volatilization. If this loss is taken into consideration, the true mineral content of milk will be found to be quite different from that represented by the ash. This point is brought out by the figures given in Table III; these were obtained from milks of average composition by Van Slyke and Bosworth[2] in the case of cow's milk, and by Bosworth[6] for human

milk. Cow's milk, giving a total ash amounting to 0.725 per cent, will be seen to really contain mineral elements to the extent of 0.804 per cent, while human milk, giving a total ash amounting to 0.227 per cent, will be seen to contain mineral elements to the extent of 0.231 per cent.

The incineration of milk leaves an ash in which the arrangement of the elements is altogether different from that in which they were present in the original milk. The following statement of the forms in which the mineral elements are present in milk is given as the result of extended studies of the chemistry of milk by Bosworth and Van Slyke.[7]

TABLE III. MINERAL ELEMENTS IN MILK AND MILK ASH

	Cow's Milk		Human Milk	
	In Ash From 100 c.c. Milk	In 100 c.c. Milk	In Ash From 100 c.c. Milk	In 100 c.c. Milk
	Gm.	Gm.	Gm.	Gm.
SO_3	0.025	0.054	0.002	0.004
P_2O_5	0.1119	0.249	0.034	0.036
Cl	0.076	0.076	0.038	0.038
CaO	0.201	0.201	0.050	0.050
MgO	0.022	0.022	0.005	0.005
K_2O	0.145	0.145	0.086	0.086
Na_2O	0.074	0.074	0.020	0.020
	0.742	0.821	0.235	0.239
Oxygen equivalent to chlorin	0.017	0.017	0.008	0.008
TOTALS	0.725	0.804	0.227	0.231

It is known that bottle-fed infants absorb and retain a much smaller percentage of the mineral elements ingested than is the case with breast-fed infants, and this has been considered due to the fact that bottle-fed infants receive an excess of mineral elements. While this is true in part it should be pointed out that recent investigations by Bowditch and Bosworth[3] have shown that all the mineral constituents present in cow's milk are not available to the infant as a food and are eliminated in the feces. These investigations have shown that dicalcium phosphate, which salt Bosworth[6] has shown to be a normal constituent of cow's milk but to be absent in human milk, is practically inert in so far as its food value is actually concerned.

It will be seen therefore that the consideration of the forms in which the mineral elements are present is an important factor; and that in calculating the amount of mineral elements present and available in modified cow's milk as used for infant feeding the dicalcium phosphate present should be considered unavailable and a corresponding deduction made from the total mineral elements in this milk.

TABLE IV. FORMS IN WHICH THE MINERAL ELEMENTS ARE PRESENT IN MILK.

Organic Combination	In 100 c.c. Cow's Milk	In 100 c.c. Human Milk
	Gm.	Gm.
Sulphur within the casein and albumin	0.022	0.001
Phosphorus within the casein	0.022	0.001
Salt Combinations		
Calcium combined with the protein	0.054	0.024
Dicalcium phosphate, $CaHPO_4$	0.175	0.000
Mono-magnesium phosphate, $MgH_4P_2O_8$	0.103	0.027
Dipotassium phosphate, KH_2PO_4	0.230	0.000
Monopotassium phosphate, KH_2PO_4	0.000	0.069
Potassium citrate, $C_6H_5O_7K_3$	0.052	0.103
Sodium citrate, $C_6H_5O_7Na_3$	0.222	0.055
Calcium chlorid, $CaCl_2$	0.119	0.059
Iron	Trace	Trace
TOTAL SALTS	0.955	0.337

Chemical Changes Produced by the Addition of Lime Water to Milk.—The practice of adding lime water to milk which is to be used for infant feeding has been based, first, upon the erroneous assumption that the acidity of cow's milk is much higher than that of human milk[6] and must be reduced before it can be used as a food for infants; and

second, upon the well-known fact that lime water, when added to milk in sufficient amount, inhibits the curdling of the casein by rennin, and hence, by deduction, will prevent the formation of casein curds in the stomach, a source of trouble in infant feeding.

The technic employed in this investigation is the same as that used by Van Slyke and Bosworth[1] in their studies of cow's milk, human milk, and goat's milk. A complete chemical analysis of the milk being first obtained, it is then filtered through porous porcelain filters. The filtration divides the milk into two portions, a soluble filterable portion and an insoluble or unfilterable portion. The composition of these two portions was determined by chemical analysis.

Table V. Changes Produced by the Addition of Lime Water to Cow's Milk*.

Sample No.	1		2			
Lime water added, per cent.	0	50	0	$16\frac{2}{3}$	$33\frac{1}{3}$	50
Reaction (+ = acidity; — = alkalinity) as c. c. of 0.1 N required to neutralize 100 c. c.						
Whole milk	+6.8	—15.3	+8.4	0.0	—7.0	—16.6
Serum	+6.6	+ 1.9	+7.8	+4.2	+2.2	+ 2.2
CaO*	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*
Total	0.1947	0.2982	0.2106	0.2505	0.2710	0.3141
Insoluble combined with casein	0.0759	0.0759	0.0857	0.0857	0.0857	0.0857
Insoluble combined with P_2O_5	0.0524	0.1750	0.0586	0.0934	0.1291	0.1738
Total insoluble	0.1283	0.2509	0.1443	0.1891	0.2148	0.2595
Soluble	0.0664	0.0473	0.0663	0.0614	0.0562	0.0546
P_2O_5*						
Total	0.2314	0.2314	0.2554	0.2554	0.2554	0.2554
Organic in casein	0.0497	0.0497	0.0545	0.0545	0.0545	0.0545
Inorganic, total	0 1817	0.1817	0.2009	0.2009	0.2009	0.2009
" insoluble	0.0633	0.1433	0.0752	0.1172	0.1376	0.1595
" soluble	0.1154	0.0284	0.1257	0.0837	0.0633	0.0414
Citric acid*						
Total	0.1684	0.1684	0.1795	0.1795	0.1795	0.1795
Insoluble	0.0000	0.0381	0.0000	0.0000	0.0184	0.0370
Soluble	0.1684	0.1301	0.1795	0.1795	0.1611	0.1425
Casein	3.10	3.10	3.40	3.40	3.40	3.40

*Per 100 c. c. of original milk.

The nature of the chemical changes brought about by the addition of lime water to cow's milk will be understood by an examination of the figures given in Table V.

Cow's milk when used as a food for infants is usually diluted with an equal or greater volume of water which may carry other substances in solution or suspension, such as lactose, calcium hydroxid, barley flour, maltose, etc., and in order to make the conditions surrounding the milk used for this investigation as nearly comparable to feeding conditions as possible the desired amount of lime water was added to the milk, and this mixture then diluted to twice the volume of the original milk. The results obtained so demonstrates the presence of alkaline phosphates, for it will be noticed that while the original milk and its serum had an acid reaction, the addition of lime water brought the reaction of the serum towards the neutral point and the reaction of the unfiltered milk became alkaline, showing that in filtering the milk to obtain the serum, insoluble alkaline salts were removed or failed to pass through the filter. If milk to which 50 per cent of lime water has been added is centrifugalized, a sediment is obtained which is a

Table VI. Insoluble Acids and Bases in Milk and Milk Plus Lime Water Calculated to Gram Equivalents[8].

Sample No.	Lime water added.	Casein as an octavalent acid.	$\frac{P_2O_5}{2}$ as a divalent acid.	Citric acid as trivalent acid	Sum of acids.	Calcium.	Excess of base.
1	0	27.9X10^{-4}	17.8X10^{-4}	0.0X10^{-4}	45.7X10^{-4}	45.8X10^{-4}	0.X10^{-4}
1	50	27.9	40.4	6.0	74.3	89.6	15.3
2	0	30.6	21.2	0.0	51.8	51.5	0.0
2	$16\frac{2}{3}$	30.6	33.0	0.0	63.6	67.5	3.9
2	$33\frac{1}{3}$	30.6	38.8	2.9	72.3	76.7	4.4
2	50	30.6	44.9	5.8	81.3	92.7	11.4

in this study, however, have been reported on the basis of the original volume of the milk.

The amounts of the insoluble constituents present in the milk and the milk to which the lime water has been added as shown in Table V have been calculated to gram equivalents and will be found in Table VI. In making these calculations phosphoric acid has been considered a divalent acid because it has been shown by Van Slyke and Bosworth[1] that the insoluble inorganic phosphorus normally present in fresh cow's milk, is in the form of dicalcium phosphate, $CaHPO_4$. It will be noticed that in the fresh milk there is a balance of bases and acids, while the addition of lime water to the milk produces an excess of base, which means of course, that the insoluble phosphate is now a mixture of di- and tricalcium phosphate.

The acidity or alkalinity as determined by the method of Van Slyke and Bosworth[7] al-

mixture of calcium caseinate and calcium phosphates. Such a sediment, treated with alcohol and ether to dry it, gave the following figures upon analysis:

	Per cent
Casein	21.84
Total P_2O_5	34.784
Organic P_2O_5 in casein	0.350
Inorganic P_2O_5	34.434
CaO	32.474

Upon calculating these figures to gram equivalents, we obtain casein 19.7x10^{-3}, inorganic P_2O_5 as a divalent acid 969.8x10^{-3}, sum of casein and inorganic P_2O_5 989.5x10^{-3}, calcium oxid 1,159.8x10^{-3}. It will be seen from these figures that the calcium present is more than enough to form the neutral dicalcium phosphate with the P_2O_5 present, but not enough to form the alkaline tricalcium phosphate, the result being a mixture of the two.

In this connection it is of interest to recall that Clark[9] in studying the change in hy-

drogen ion concentration produced by the addition of lime water, or sodium citrate to milk concluded that the use of sodium citrate was the more objectionable because it produced an alkaline reaction in the milk, while the use of lime water produces a reaction near the neutral point. As he used the electrical method to determine his hydrogen ion concentrations, it will be seen at once that he failed to take into consideration the insoluble alkaline phosphates present.

This investigation concerning the addition of lime water to milk shows the following facts:

(1) While the addition of lime water to milk increases the total calcium present, it brings about a marked change in the arrangement of the salts of the milk which results in a precipitation of calcium, phosphorus and citric acid.

(2) The addition of lime water to cow's milk, which normally contains some insoluble calcium phosphate, results in the precipitation of more insoluble calcium phosphate, the insoluble phosphate under these conditions being a mixture of di- and tricalcium phosphate, $CaHPO_4$ and $Ca_3P_2O_8$.

(3) The addition of lime water to milk brings the reaction of the milk serum towards the neutral point, the soluble alkalinity of the lime water being consumed in the precipitation of the insoluble calcium phosphate mentioned above.

The addition of lime water to milk, produces chemical rearrangements in the salts of milk which necessitate a consideration of the following factors:

(1) The reduction in the amount of available calcium.

(2) The reduction in the amount of available phosphorus.

(3) The reduction in the amount of soluble citrates.

(4) The reduction in the amount of soluble calcium salts and the effect produced thereby upon the nature of the casein curds.

The Available Mineral Elements in Cow's Milk, Cow's Milk to Which Lime Water Has Been Added, and Breast Milk.—We have used the word available in connection with food substances and it may be well for us to explain what we mean. Any food component which is capable of being absorbed we consider available. This absorption may or may not be preceded by a process of digestion. Any food incapable of being absorbed either before or after digestion is unavailable. Dicalcium phosphate undergoes no process of digestion and is not absorbed and therefore is not available. Certain fats are digested but, in the presence of calcium, form insoluble calcium soaps and these soaps not being absorbed are therefore rendered unavailable by the process of digestion.

By the use of Tables III, IV and V we are able to secure the figures given in Table VII, showing the amounts of available mineral elements in cow's milk and in cow's milk after the addition of calcium hydroxid (lime water). For comparison we have given the total mineral content of cow's milk in column one and the total and available mineral content of human milk in column five.

In connection with the figures given in Table VII we wish to call attention to the fact that while cow's milk contains a total of 0.201 per cent of calcium oxid, it contains only 0.129 per cent of soluble calcium oxid, 64.1 per cent of the total being soluble and the remainder being present as insoluble calcium phosphate. It has been shown in a previous paper[3] that, depending upon the age of the child, none or only a small portion of the calcium present in milk as dicalcium phosphate is absorbed or takes any part in the formation of calcium soaps when cow's milk is fed to infants, but that soaps are formed as the result of a reaction between the fatty acids and the soluble calcium present in milk.

Infants receiving modified milk mixtures containing fat, excrete about 20 per cent of the total calcium ingested in the stools as calcium soaps. If 64.1 per cent of the total calcium oxid in milk is soluble and if a

quantity of this soluble calcium oxid equal to 20 per cent of the total calcium oxid is lost in the stools as calcium soaps, we will therefore have 44.1 per cent of the total calcium oxid in the milk absorbed.

Holt, Courtney and Fales[10] have shown that in the feeding of milk formulas to infants it is necessary that 0.19 grams (2.943 grains) of total calcium be fed in order to secure the absorption of 0.09 grams (1.27 grains), or, in other words, 47.7 per cent of the calcium fed in the milk is absorbed.

As an approximate statement it may therefore be said that 50 per cent of the calcium present in cow's milk will be absorbed under ordinary conditions.

The Available Mineral Elements Present in Modified Milk Formulas.—In most, if not all, of the ways for modifying cow's milk the mineral elements present receive very little consideration, being passed over with the statement that modified cow's milk will always contain a larger percentage of ash than breast milk and therefore much more milk salts will be given to infants receiving modified milk than they require. From the data presented here it will be seen that this is an erroneous stand to take, for the ash constituents cannot be considered as a group but must be considered individually. This point is distinctly shown by the figures for a formula containing 1.00 per cent protein. In this case the food will contain a total ash of 0.25 per cent and an available ash of 0.20 per cent, compared with a total and available ash of 0.23 per cent in breast milk, not a very great difference insofar as the total ash is concerned, but if we carry our comparison to the individual mineral elements we shall find some very striking differences, for this 1.00 per cent protein formula will have a chlorin content of 0.024 per cent compared with 0.038 per cent in breast milk, and a potassium oxid content of 0.045 per cent compared with 0.086 per cent in breast milk. A child receiving a formula with 1.00 per cent protein is taking a total ash greater than that found in breast milk but is being underfed with respect to chlorin and potassium, if the chlorin and potassium content of breast milk is taken as a standard.

As the amounts of mineral elements in any modified milk formula will depend upon the quantities of whole milk or skimmed milk

Table VII. Total and Available Mineral Elements in Cow's Milk, Cow's Milk Plus Calcium Hydroxid (lime water), and Breast Milk.

	Total mineral elements in cow's milk	Available in untreated cow's milk	Available in cow's milk plus calcium hydroxide equal to 25 per cent of lime water	Available in cow's milk plus calcium hydroxide equal to 50 per cent of lime water	Total and available in human milk
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*
SO_3	0.054	0.054	0.054	0.054	0.004
P_2O_5	0.249	0.158	0.096	0.074	0.036
Cl	0.076	0.076	0.076	0.076	0.038
CaO	0.201	0.129	0.119	0.117	0.050
MgO	0.022	0.022	0.022	0.022	0.005
K_2O	0.145	0.145	0.145	0.145	0.086
Na_2O	0.074	0.074	0.074	0.074	0.020
Totals	0.821	0.658	0.586	0.562	0.239
Oxygen equivalent to chlorin	0.017	0.017	0.017	0.017	0.008
Grand Totals	0.804	0.641	0.569	0.545	0.231

and cream used to give the desired percentage of protein, it is very easy to calculate the amounts of available mineral elements present in any formula. The results obtained in this way are given in Table VIII. In consulting these figures it should be understood that they are average figures obtained from milk of average composition.

General Conclusions.—Taking breast milk as the standard, an examination of the figures in Table VIII shows that all modifications, made by the use of cream and whole milk or skimmed milk which contain less than 2 per cent protein, are deficient with respect to chlorin or potassium or both, and that all modifications containing more than 1.25 per cent protein have an excess of available calcium. By the addition of from 25 to 50 per cent of lime water to the milk and cream, some of the excess calcium is precipitated as unavailable calcium phosphate and in this case formulas containing over 1.50 per cent of protein have an excess of available calcium.

The overfeeding of available calcium is to be guarded against because it results in the appearance of calcium soaps in the stools and these soaps may be the cause of excessive constipation. The addition of 25 per cent or more lime water to modified milk mixtures will reduce the available calcium.

As far as the mineral elements are concerned, therefore, the question as to which modification of whole milk or skimmed milk and cream to feed seems to resolve into an effort to bring the protein content as near 2 per cent as possible in order to feed the proper amounts of chlorin and potassium

Table VIII. Available Mineral Elements in Different Modified Cow's Milk Formulas as Compared to Those in Breast Milk.

Protein.....	*Per cent* 0.75	*Per cent* 1.00	*Per cent* 1.25	*Per cent* 1.50	*Per cent* 1.75	*Per cent* 2.00	*Per cent* 2.25	*Per cent* 2.50	*Breast Milk*
No Lime Water Added									
Ash	0.150	0.200	0.250	0.300	0.350	0.400	0.450	0.500	0.231
SO_3	0.013	0.017	0.021	0.025	0.030	0.034	0.038	0.042	0.004
P_2O_5	0.037	0.049	0.061	0.074	0.086	0.098	0.111	0.124	0.036
Cl	0.018	0.024	0.030	0.036	0.042	0.048	0.053	0.060	0.038
CaO	0.030	0.040	0.050	0.060	0.070	0.080	0.090	0.100	0.050
MgO	0.005	0.007	0.009	0.010	0.012	0.014	0.015	0.017	0.005
K_2O	0.034	0.045	0.056	0.068	0.079	0.090	0 102	0.113	0.086
Na_2O	0.017	0.023	0.029	0.035	0.040	0.046	0.052	0.058	0.020
Lime Water Added Equal to 25 Per Cent of the Milk and Cream Used									
Ash	0.133	0.178	0.222	0.267	0.311	0.356	0.400	0.445	0.231
SO_3	0.013	0.017	0.021	0.025	0.030	0.034	0.038	0.042	0.004
P_2O_5	0.023	0.030	0.037	0.045	0.053	0.060	0.068	0.075	0.036
Cl	0.018	0.024	0.030	0.036	0.042	0.048	0.053	0.060	0.038
CaO	0.028	0.037	0.046	0.056	0.065	0.074	0.084	0.098	0.050
MgO	0.005	0.007	0.009	0.010	0.012	0.014	0.015	0.017	0.005
K_2O	0.034	0.045	0.056	0.068	0.079	0.090	0.102	0.113	0.086
Na_2O	0.017	0.023	0.029	0.035	0.040	0.046	0.052	0.058	0.020
Lime Water Added Equal to 50 Per Cent of the Milk and Cream Used									
Ash	0.128	0.170	0.231	0.255	0.298				
SO_3	0.013	0.017	0.021	0.025	0.030				
P_2O_5	0.017	0.023	0.029	0.035	0.040				
Cl	0.018	0.024	0.030	0.036	0.042				
CaO	0.027	0.037	0.046	0.056	0.064				
MgO	0.005	0.007	0.009	0.010	0.012				
K_2O	0.034	0.045	0.056	0.068	0.079				
Na_2O	0.017	0.023	0.029	0.035	0.040				

and to add lime water in order to reduce the amount of calcium available for the formation of soap. A formula containing between 1.75 and 2.00 per cent protein would seem to be the most desirable one and the one to be fed as soon as possible under ordinary conditions. It is of interest to note in this connection that a formula made by using half milk and half water has a protein content of from 1.60 to 1.75 per cent, and as a matter of clinical observation it is generally held that as soon as a child can be given this formula its general condition and progress is more satisfactory.

Another constituent of milk which is entirely ignored in all modified milk formula is citric acid. Cow's milk contains about 0.20 per cent and human milk about 0.11 per cent of this substance. Nothing is known about the function of this acid but we may be safe in assuming that its presence in milk is an indication that it serves some purpose. If breast milk is taken as the standard we can easily see that all modified milk formulas containing less than 1.6 per cent protein are deficient in citric acid. If whey is used as a constituent of low protein formula this deficiency in citric acid may be corrected.

References

1. Van Slyke, L. L., and Bosworth, A. W.: *The Journal of Biological Chemistry*, 1915, xx, p. 135.
2. Bosworth, A. W., and Van Slyke, L. L.: *The Journal of Biological Chemistry*, 1916, xxiv, p. 187.
3. Bowditch, H. I., and Bosworth, A. W.: *The Boston Medical and Surgical Journal*, 1917, clvii, p. 864.
4. Bosworth, A. W., Bowditch, H. I., and Giblin, L. A.: *American Journal of Diseases of Children*, 1918, xvi, p. 279.
5. Bosworth, A. W., and Bowditch, H. I.: *American Journal of Diseases of Children*, 1918, xvi, p. 279.
6. Bosworth, A. W.: *The Journal of Biological Chemistry*, 1915, xx, p. 707.
7. Van Slyke, L. L., and Bosworth, A. W.: *Journal Biological Chemistry*, 1913, xiv, pp. 202, 207, 211, 227, and 231; 1914, xix, pp. 67, and 73; 1915, xx, p. 135; and 1916, xxiv, p. 187.

 Bosworth, A. W.: *Journal Biological Chemistry*, 1915, xx, p. 707.
8. Bosworth, A. W., and Bowditch, H. I.: *The Journal of Biological Chemistry*, 1917, xxviii, p. 431.
9. Clark, W. M.: *Journal Medical Research*, 1914-15, xxxi, p. 431.
10. Holt, L. E., Courtney, A. M., and Fales, H. L.: *American Journal of Diseases of Children*, 1920, xix, p. 97.

THE TOXIC EFFECTS OF DIGITALIS

BY JAMES G. CARR, M.D.

CHICAGO.

THE intensive study directed to the action and uses of digitalis in the past decade has served to give us accurate data as to the physiological effects of the drug, and to modify materially very many of our former ideas concerning its therapeutic uses. It is now prescribed with more precision and confidence, and the expected results are more uniformly obtained, as a more accurate knowledge of its action and a better understanding of its toxic effects have given us greater courage in its administration. Among the practical results of this study the work of Eggleston deserves especial mention; he has emphasized the fact, that given a potent digitalis, the effects of the drug may be made manifest, though these effects are not necessarily the favorable changes in the circulation, to produce which the drug has been administered. Moreover, these effects are not dependent upon the preparation used, but are obtained only where the particular preparation is given in sufficient dosage. Variations in the quality of the drug do exist, but with a potent digitalis, whether used as tincture, infusion or powdered leaves, the therapeutic results may be hoped for, the physiological effects may be expected. The drug, as it has been used, prior to a recent period, has often been ineffective, not only because of its relative impotency at times, but more often, far more often, because of insufficient dosage, and this habit of using insufficient doses has resulted from a widely prevalent fear of inducing the toxic effects of the drug.

This paper is undertaken with no purpose of antagonism to the use of effective doses; it may now be said that, with the freer administration of larger doses, the usefulness of the drug has been multiplied many times. Effective therapeutic results do not depend upon the employment of any one system of administration; the choice of a particular preparation of the drug is of minor importance; the essential purpose of digitalis therapy is the production of the digitalis effect, which can be attained only by the use of larger doses than have hitherto been widely employed. A knowledge of the toxic effects of the drug make possible its use with greater freedom; when these guide-posts are known and watched for, the drug can be used to its therapeutic effect with greater confidence; and a host of cases of a type once regarded as not responsive to treatment can be made to show the beneficial effects of the drug. The term "toxic", as it will here be used, does not refer to the late poisonous effects, but rather to the unpleasant and distressing, sometimes dangerous, symptoms produced by the drug, which indicate its discontinuance, and which almost invariably disappear promptly with such discontinuance. The significance of these various "toxic" effects and their bearing upon treatment are of fundamental importance in the use of the drug. In pushing the drug to its therapeutic effect, knowledge of the symptoms which mean danger is imperative. A brief review of these toxic effects will be presented, and to the more generally recognized of these effects, will be added for your consideration one of much less frequent occurrence, based on two cases observed in the Cook County Hospital, Chicago.

The important toxic effects of digitalis may be classified in three main groups:

those manifested by (1) the cariovascular system; (2) by the gastro-intestinal system; and (3) by the nervous system. According to Christian, these essentials were summarized in 1785 by Withering, whose original statement is thus quoted: "Let the medicine be continued until it either acts on the kidneys, the stomach, the pulse or the bowels; let it be stopped upon the first appearance of any of these effects." You will note that Withering's first reference was to the effect on the kidneys, which will not be further discussed here; the effect of digitalis on the kidney is generally regarded now as secondary to its effect on the circulation, and the question as to whether or not it exerts a direct effect on the renal epithelium is still unsettled. On the other hand, no mention is made of the headache, a frequent and distressing symptom.

The effects on the cardiovascular system may be grouped in three classes: (1) on the cardiac muscle; (2) on the vagus nerve; (3) on the vessels. From the therapeutic standpoint, the principal effects of digitalis are those which it has on the cardiac muscle and on the heart, through the medium of the vagus.

(1) On the muscle itself its effect is to strengthen the force of the systolic contraction, actually increasing the systolic output. Tonicity and contractility are increased. Carried to an excess, this effect on the muscle manifests itself usually in the following sequence: when the pulse is regular, premature ventricular contractions or extrasystoles occur, soon followed by the *pulsus bigeminus;* where auricular fibrillation is present, bedside examination will not reveal the presence of the premature contractions; *pulsus bigeminus* occurs without warning, as may also happen with the regular pulse. The *pulsus bigeminus,* or coupled rhythm, is characterized by a sequence of strong beats, each regularly and quickly followed by a weak one; the beats appear in pairs. The second beat is frequently imperceptible at the wrist. By instrumental means it has been shown that the strong beat is the normal one, the ventricle responding to a supraventricular impulse; the second or weaker beat has its origin in the ventricle. It is significant of an undue, even dangerous irritability of the ventricular muscle. The appearance of the coupled rhythm is always an indication for the discontinuance of digitalis; in the presence of this rhythm, continued administration of the drug may result in sudden death. Robinson has shown experimentally that digitalization to the point of producing the *pulsus bigeminus* means that about 80 per cent of the lethal dose has been given.

(2) Through stimulation of the vagus nerve, the conduction of impulses through the bundle of His is inhibited. This may depend upon a purely vagus effect, but in auricular fibrillation, it is pretty well established that the digitalis effect is heightened and the action of the drug more marked, because disease has rendered the conduction fibers directly susceptible to digitalis. The especially favorable effects of the drug in auricular fibrillation are to be attributed to this unusual effect on the bundle fibers, with consequent protection of the ventricles from the disorderly auricular rhythm; this view is accepted by Cushny and Mackenzie. Whether the inhibition of conduction is due to vagus depression or to an immediate effect on the bundle, the effect of digitalis is to slow the pulse, and in excess to produce a variable degree of block even in the cases presenting originally a regular pulse. The therapeutic value of digitalis in auricular fibrillation is dependent upon the inhibition of conduction, in effect, a block. In either case, when this effect has lowered the heartbeat to 50 or below, the further use of digitalis is contraïndicated. Where heart-block, partial or complete, occurs as the result of digitalis, the drug should be stopped.

(3) The question of the effect of digitalis upon the blood-pressure may be briefly dismissed. In its therapeutic administration, digitalis probably never raises the blood-pressure to a dangerous degree. Hypertension in itself is not a contraïndication to the use of digitalis; where broken compensation is associated with high blood-pressure,

digitalis is indicated; the effect on the broken compensation is obtained without any untoward increase of blood-pressure.

Digitalis produces certain definite effects on both stomach and intestine. There may be some slight local irritation of the gastric mucous membrane as a result of a local effect of the drug, but the persistent nausea, often associated with vomiting, occurring after the administration of fairly large amounts of digitalis is a central and not a local effect. Exactly the same symptoms occur with the subcutaneous or intravenous use of the drug to the point of physiological effect. Preceding the onset of the nausea, there is often a loss of appetite with a vague sense of discomfort in the epigastrium, symptoms which should lead us to consider the medication as a possible cause. Changing the preparation or the mode of administration will be of no avail; the onset of the symptoms cited means an approach to the limit of tolerance for the particular patient; with the appearance of the nausea, only harm can be done by continuing the digitalis. There are cases in which the nausea continually occurs before the desired effects of the drug on the circulation appear; under such circumstances the prognosis is not good. Fortunately it is not unusual to find that improvement in the cardiac condition continues after the withdrawal of the drug. Indeed, it sometimes appears that the patient's general condition has been made much worse as a result of the constant nausea and, having been given digitalis enough to produce these effects, his circulatory symptoms are much better after cessation of the medication and disappearance of the nausea. It should be mentioned in passing that White and Morris have expressed a hope that in the Minnesota leaf, the digitalis lutea, they have found a preparation less likely to produce the gastric symptoms. They say: "We are encouraged in studying this drug further with the hope of finding a preparation with digitalis action that produces less of these annoying effects." Digitalis occasionally produces diarrhea, though this is not a common event.

The most common nervous disturbance is the headache, which is characterized by its persistence and severity. Now and then, the headache appears upon the administration of doses insufficient from a therapeutic standpoint and makes impossible the successful use of the drug. In such a case seen recently the decompensation could not be overcome; cardiac response to digitalis was prompt, but invariably headache of such severity supervened before enough could be given to restore compensation, that the heart could not be brought under control.

Two cases, seen through the courtesy of Dr. Ellis Kerr on his service at the Cook County Hospital, Chicago, brought up the question as to the occurrence of delirium as a toxic effect of digitalis.

Silas S., a colored man of 70, was admitted to the hospital December 28, 1916 with broken compensation. The heart was moderately enlarged, the pulse was around 100, regular, of fairly good volume; there was marked hepatic enlargement and moderate edema of the extremities. There was general arteriosclerosis. Beginning January 1, 1917, infusion of digitalis was administered; for a time improvement was marked. On the 18th of January it was reported that the patient complained of severe headache; five days later he began to vomit; on the 24th it was noted that he was weak and suffering with epigastric pain, and on the 26th he was irrational. The mental condition was one of confusion and apathy; there was no active delirium; physical and mental prostration was extreme. On the 26th the pulse was 56; on the 27th, 46; there were occasional records as low as 40. The digitalis was stopped January 28th; for four days there was slight change. From the 2nd of February, improvement, both mental and physical, began; on the 12th, the patient was "up and about"; on February 15th he was discharged in good condition; the pulse was 72; there was no edema.

George K., aged 70, was admitted to the hospital February 25, 1917. He complained of swelling of the legs, cough and shortness of breath. He had been troubled for two years, but the symptoms had been much aggravated during the three weeks prior to admission. There was broken compensation with auricular fibrillation, probably on the basis of an arteriosclerotic heart. The pulse was about 100, blood-pressure 154-110. From February 28th until March 16th, one ounce of infusion of digitalis was given daily in divided doses. On March 13th it was noted that he was "quite uncomfortable"; on the 15th, "very weak, irrational". The pulse at these dates ranged from 36 to 54. As mentioned, digitalis was stopped on the 16th. On the 17th he was "wakeful, noisy and irrational"; pulse was 34 to 48. Beginning with the 19th, three days after the discontinuance of the digitalis, records are found thus: "quiet all night", and "much better night". The mental condition distinctly improved, though it did not return to normal; from the 30th of March he was much worse; death occurred April 1st. There is no record of nausea,

epigastric pain or headache. Autopsy showed; the following: "Fatty changes in the liver and myocardium, dilatation of the tricuspid ring, passive hyperemia, and edema of the lungs; right-sided hydrothorax; passive hyperemia of the liver; marked increase of the fatty tissue in the renal pelves; multiple retention cysts of both kidneys; chronic diffuse nephritis; general arteriosclerosis; right lower lobar pneumonia."

There is little in the literature regarding the occurrence of delirium as a toxic effect of digitalis, save as a late poisonous effect in experimental work, and it is with considerable reserve as to their significance that these cases are presented. It must be freely admitted that there is just ground for the opinion, that, with a drug so widely used, delirium might be expected to occur frequently in the course of digitalis therapy, if it occurs as a result of this drug at all. And such is not the case; in spite of the wide use of the drug, the text-books on heart diseases refer, if at all, to this effect of digitalis in a noncommittal manner, and the text-books on pharmacology generally ignore the subject. For instance, Hirschfelder dismisses the subject with these words: "Another toxic effect of digitalis lies in the production of mental symptoms, delirium and delusions, through its action on the central nervous system. The onset of these symptoms, therefore, constitutes a contra-indication to the continuance of the drug." And Wilcox says, "While the cerebrum is not directly affected by digitalis, the disturbances in its circulation, caused by the drug, are liable to give rise to severe headache, excessive vomiting, dizziness, vertigo, confusion of sight, and possibly hallucinations and delirium."

The subject was first discussed by Duroziez in 1874, and later by Hall in 1901 and 1905. No one of these articles will stand the test of rigid criticism.

In spite of the impression made by the prompt disappearance of the delirium following the discontinuance of the digitalis, especially striking in the first of these cases presented, a fair statement requires the admission that the cases, though suggestive, do not prove the contention that digitalis may cause such a delirium, as a primary effect of the drug in its therapeutic administration. In these cases there was a delirium characterized by mental confusion and apathy; the depression, physical and mental, was extreme. In the second case, there were occasional records of a delirium characterized as "noisy"; this was rather the noise of a wakeful, muttering patient, than of an active, noisy delirium. In the first case the delirium disappeared about four days after the discontinuance of the digitalis; in the second, the mental condition was much improved after three days from the time the drug was stopped, but it never became normal.

Three objections may be brought against the acceptance of these cases, as manifesting a true digitalis delirium:

(1) The delirium may have been the result of the cardiac decompensation rather than a toxic effect of the drug used to combat it. In these 2 cases, that objection can be quickly answered: here the delirium did not exist at the time of admission, at which time cardiac decompensation was the outstanding feature. In both cases the cardiac symptoms had distinctly receded before the onset of symptoms of digitalization; with these latter, the delirium developed.

(2) The delirium, when it occurs, may be the effect of cerebral anemia, consequent upon the marked slowing of the pulse. This is plausible; yet it is true that delirium is not common in patients under the influence of digitalis, while marked slowing of the pulse is a frequent occurrence. Moreover, the slow pulse of heart-block, though associated with transient attacks of unconsciousness, is not associated as a part of the clinical picture with delirium or mental confusion apart from these attacks.

(3) In the second case, we may have been dealing with a delirium due to uremia. The possibility cannot be denied. We can only point to the obvious and prompt improvement which followed the discontinuance of the drug.

These cases are brought to your attention in the belief that the occurrence of a

delirium in the course of a case of broken compensation under treatment may be a result of the excessive use of digitalis. The delirium occurring in cases of broken compensation is without doubt usually the result of the cardiac disorder. But delirium occurring after digitalis has been administered for some time, especially where the delirium first appears after digitalis has been used in some quantity, or where an initial delirium due to the cardiac disease disappears with the general improvement under digitalis and recurs with the further administration of the drug, without the simultaneous recurrence of broken compensation may be attributed with a good deal of reason to the direct effect of digitalis on the cerebrum. The differential diagnosis between a cardiac delirium and a digitalis delirium is plainly important. In the one case the indication is for digitalis, in the other, exactly the opposite. It is worth while to observe the effects of digitalis with reference to its possible deliriant action; it is conceivable that harm has been done by interpreting such delirium as cardiac in origin and calling for digitalis. And the subject is presented with no dogmatic assertions as to a digitalis delirium, but with the hope of turning attention to the possibility of such a condition and stimulating further study.

NON-SURGICAL DRAINAGE OF THE BILIARY TRACT: ITS USEFULNESS AS A DIAGNOSTIC AND THERAPEUTIC PROCEDURE*

BY FRANK SMITHIES, M.D., F.A.C.P.,

Associate Professor of Medicine, School of Medicine, University of Illinois,

Chicago.

In conjunction with his associates, Dr. Clyde F. Karshner and Dr. Richard B. Oleson, the author shall describe in this brief preliminary report their experience with a new clinical and laboratory procedure for diagnosis and therapy of affections of the bile passages. This method enables one to secure specimens of bile from the several segments of the biliary tract from duodenum to hepatic duct radicles by direct, non-surgical drainage, and, if properly executed and controlled, it not only supplies reliable clinical information with regard to the *nature* of the biliary malfunction, but it also gives indications of practical worth respecting *just what divisions* of the biliary tract are diseased. In what may be termed a corollary to this new method of clinical investigation, the author shall outline a procedure for the treatment of certain forms of gall-bladder and bile-duct affections by non-operative drainage, coupled with an appropriate regimen. A short summary of some phases leading up to the development of the method is here indicated.

Part I.

In a study of duodenal residues directly secured by means of his tube, Max Einhorn some five years ago recorded that bile admixtures not infrequently interfered with accurate chemical analysis of the contents of the duodenum. The duodenal aspirates, either intermittently or constantly, held bile. This interference by bile greatly vitiated chemical estimations of duodenal juice acidity. Such resulted not only because the inconstancy of bile admixtures introduced a variable factor into fractional test-meal investigations, but also because, not rarely, the bile admixed, was abnormal in kind: it was abnormal in quantity and physically, chemically, cytologically and bacteriologically. After further observing the alterations in the physical properties of these bile residues, and endeavoring to correlate these variations with clinical and physical findings, Einhorn ventured the suggestions that by such study of duodenal contents, particularly with respect to their "contamination" with bile, it was possible to hazard opinion with regard to the nature and extent of biliary tract disease. Shortly afterwards, Rehfuss and his associates made a similar suggestion, but, with Einhorn, were fully alive to the wide range of error possible in such diagnostic methods. Bile, as thus obtained in duodenal contents, was mixed with gastric, duodenal and pancreatic juices, was commonly befouled with the bacterial flora of the upper alimentary tract, and, what was most important, the bile secured from duodenal residues in so haphazard a fashion, was doubtless not representative of bile held by the gall-bladder or the gall-ducts, or of that bile freshly excreted from the liver in any given subject. Thus far, the only method of studying the bile content of the various segments of the biliary tract was by experimental surgery or at operation when bile could be directly obtained from the gall-bladder or the ducts. Obviously such procedure could have little place in the practi-

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cal clinical diagnosis of patients ill, or supposed to be, from ailments of the liver or biliary tract. If chemical or microscopical studies of bile were to be depended upon to furnish diagnostic information previous to laparotomy, it is evident that a procedure had to be devised whereby the contents of the biliary tract could be secured as far as possible free from contamination by residues in the alimentary tract, these, in fresh condition, suited to chemic, cytologic and cultural investigation and, if possible after such method, as would enable one to localize, from his data, the significance of abnormal findings, with regard disease, in the whole or specific segments of the biliary tract.

In connection with a study of the physiology of the neuro-muscular reflexes of the alimentary tract, in 1917, Meltzer of the Rockerfeller Institute, appended an obscure note. This states that he had observed that when water solutions of magnesium sulphate were applied *directly* to the duodenal mucosa, *without such solutions having first come into contact with the gastric mucosa,* there followed a readily recognizable relaxation of the muscular wall of the duodenum, a coïncident relaxation of Oddi's sphincter at the papilla of Vater, and within a brief period, contraction of the muscle-bundles in the gall-bladder wall, and discharge of bile into the duodenum. In normal humans, this sequence of events has been shown by Lyon, Brown and others to follow the direct application of solutions of magnesium sulphate to the duodenal mucosa through the duodenal tube. Its occurrence is in keeping with Meltzer's law of "contrary innervation" in other parts of the alimentary tract, namely, that in normal subjects, under stimulus, *relaxation* of a nerve-muscle segment of the gut occurs rhythmically in association with contraction of a neurologically interrelated, proximal segment of that gut. In the biliary tract, the sphincter of the common bile-duct (Oddi's sphincter) and the muscles of the gall-bladder are supplied with inhibitory and motor nerve-fibers from the splanchnics and the vagus. These act antagonistically to each other, *i. e.,* when stimulation of the inhibitory nerve-fibers in the wall of the duodenum (and with it, Oddi's sphincter) causes relaxation of the gut (and of Oddi's sphincter) simultaneously (or soon following), there occurs stimulation of the correlated vagus motor nerve-fibers in the gall-bladder wall, with resultant muscle contraction and discharge of bile.

Although Meltzer's observations were made upon laboratory animals, he recognized their clinical importance, and, at his first presentation, pointed out their possibilities of usefulness both diagnostically and therapeutically. This prophecy was shortly confirmed by the work of Rost and of Vincent Lyon. Lyon introduced solutions of magnesium sulphate directly into the duodenum by means of the Rehfuss tube and was then able to aspirate through the tube bile freshly discharged from the biliary tract. Furthermore, he showed that bile so obtained might be visually segregated with practical accuracy, with regard to the segment of the biliary tract from which it came, namely, the common bile-duct, the gall-bladder and the hepatic ducts. It further has been proven, that by microscopical examination it is not only possible, from cytologic study of these freshly obtained, biliary tract fractions, to secure definite information with respect to the *origin* of each fraction, but also to determine, with considerable accuracy, the *nature, degree* and *etiology* of pathologic processes existing in the gall-bladder and gall-ducts.

Substances introduced into the duodenum, other than magnesium sulphate, are capable of causing relaxation of Oddi's sphincter, *e. g.,* peptone, atropin or belladonna, benzyl benzoate, permanganate solutions, water, foods, etc., and sometimes the tip of a duodenal tube itself. Although such substances may cause dilatation of the duodenum and relaxation of Oddi's sphincter, with consequent limited bile discharge, they do not act in accord with Meltzer's law, as does magnesium sulphate: that is, they do not produce secondary contraction of the muscle-

coats of the gall-bladder, with resultant, frequently forceful, discharge of bile. Such special action appears to be a property peculiar to solutions of magnesium sulphate. In this respect, magnesium sulphate appears to have a specific action upon duodenal mucosa. It acts after the manner of a "duodenal hormone", as Lyon has quite appropriately stated; it relaxes Oddi's sphincter and causes gall-bladder contraction without apparently, only causing the normal, food-like stimulus to gastic and pancreatic secretion.

Part II.

For some years, the author has been interested in the observation of variations in the duodenal contents of patients in health and in disease. His curiosity was first aroused by attempting to prove the existence, or the course under treatment, of duodenal ulcer, by fractional titration of freshly removed duodenal residues. The fact that more than 38 per cent of his proved duodenal ulcers were complicated by disease of the gall-bladder, introduced a grave diagnostic error into whatever fractional duodenal-extract formulas he might construct as characteristic for duodenal ulcer. Furthermore, as his knowledge of the frequency of biliary tract complications in duodenal ulcer was more firmly established, it became a difficult problem to determine the bearing of bile-passage anomalies upon patients' symptoms; this introduced a not-to-be-disregarded factor into the significance of laboratory analysis of gastric and duodenal extracts. It was with the object of attempting to estimate the extent of biliary tract damage in association with duodenal and gastric lesions, that, a considerable period ago, the author and his associates took up the study of bile, secured through the duodenal tube after the method suggested by Meltzer.

At first their work was directed toward early and more accurate diagnosis of lesions of the biliary system, largely because they found it to be a widely established custom for physicians generally to seek elucidation of the cause of many vague dyspepsias, (seemingly of right upper quadrant origin) by surgical exploration. They further learned that competent surgical pathologists and surgeons at the operating table were not able to judge the normalcy or early disease in such gall-bladders and gall-ducts, even when these were exposed to eye and hand, and when not grossly deformed, stenosed, adherent or containing calculi. Not uncommonly, in such circumstances, a gall-bladder would be drained or removed *on suspicion,* or, after needling the gall-bladder and removing bile, this would be grossly—rarely microscopically—examined, or, if the surgeon could empty the gall-bladder and the ducts by compression, it was therefore assumed that the accessible biliary tract was free from disease and no operation was performed. In the latter circumstance, not rarely the exploratory operation was productive of no permanent relief to the patient after the physiologic rest demanded by convalescence, for after a short or long interval, the old dyspeptic disturbance returned. Moreover, their studies of seemingly innocent-appearing gall-bladders, stone-free and emptying freely upon compression, but which had been removed, showed that just such types of gall-bladder—innocent to sight and touch—returned the most pronounced evidences of active and progressive inflammation; these gave the greatest percentage of positive cultures when the tissue and the bile were carefully studied bacteriologically. The histologic damage could readily be demonstrated. This definite evidence of damage to the gall-bladder, when such appeared grossly normal at operation, demonstrated the need of a more accurate method of ascertaining the status of the biliary tract in atypic dyspepsias, than was in vogue: for in truth, the very biliary tracts which were most acutely infected and produced most annoying gastric disturbances, were those commonly let alone surgically, because they could be *emptied* by compression, were not *grossly* deformed and *contained no calculi.* Surgically, little question ever arose with respect to the ability of a diseased gall-bladder to empty itself and its ducts upon nor-

mal, physiologic stimuli. Moreover, these "innocent" gall-bladders, with walls definitely infected, and which were commonly neglected surgically, furnished the group which later became fibrosed, stenosed, adherent, and the sites of calculi and possibly, malignancy. In addition to the demand for a method of recognizing biliary tract disease earlier than was common, it seemed that there was similarly, an imperative need for the development for a system of treatment

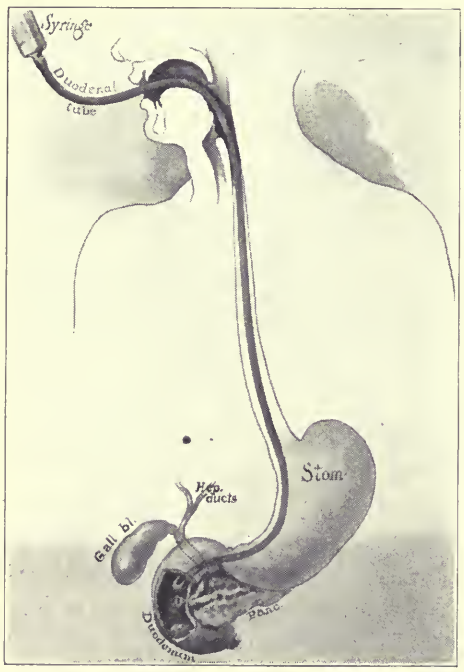


Fig. 1. Sketch showing duodenal bulb *in situ*, with aspirating syringe attached. (Drawn by Tom Jones).

which should be actively directed toward the biliary tract, and which was not merely a dietetic or therapeutic "shot-gun." Moreover, since biliary tract—particularly gall-bladder—surgery has become so widespread, the author and his associates have constantly received for treatment an increasing number of patients upon whom all forms of technical operative procedure have been performed, and who still present anomalies of digestion, the major portion of which appears to be due to imperfect liver and bile-tract function. After fairly extensive and critical experience, they consider that it is now possible to report dependably upon certain phases of the clinical usefulness of bile aspirated from the biliary tract through the duodenal tube, following the direct intraduodenal introduction of magnesium sulphate solutions. The procedure has value both diagnostically and therapeutically.

A—The Diagnostic Worth of Meltzer's Method: (1) *Method of Work.*—The procedure is simple; it can be carried out in home, office or hospital; it requires little apparatus; it is not painful, and, as far as the author's experience goes, is not dangerous. The very simplicity of the method and its ease of application, is however, somewhat to its disadvantage, especially its use in diagnosis: it is apt to lead to slip-shod, unreliable work. Unless the procedure is carefully performed, it will return little or no reliable information: it may, in fact, lead to harmful conclusions. *One must realize that the early diagnosis of disease of the bile passages is a chemic and a microscopic one.* Specimens of bile should be carefully secured *with such purpose in view,* and, *when* obtained, should be closely scrutinized, cytologically, culturally and chemically. For, if extensive destruction of the biliary tract is to be prevented, examination of freshly secured bile must be made before dyspeptic symptoms are pronounced, before obstruction to bile flow has occurred and previous to the time when the gall-bladder is distended, thickened, adherent or filled with calculi. Consequently, the patient should be properly prepared for examination, so that material aspirated through the duodenal tube is, as far as possible, uncontaminated by the contents of those portions of the alimentary and respiratory tracts, proximal to the duodenum.

The *duodenal tube* (the author prefers the Rehfuss type) should be thoroughly sterilized before it is introduced. This can be done only by boiling. It is kept in 10 per cent liquor antisepticus solution until ready to be used. The subject appears for study after a twelve-hour fast. He brings a tooth brush, spends five to ten minutes scrubbing

his teeth and gums with a good paste (Kolynos) and then thoroughly rinses his mouth and gargles with ½ per cent formalin solution. The tube is slowly fed to him from sterile gauze: its bulb reaches the stomach in a few minutes in all but very sensitive patients. (To these, a small dose of atropin or benzyl benzoate solution may be given a half hour previous to the passage of the tube). In very irritable subjects, the bulb travels to the stomach, but this is rarely required if the stomach be cleaned thoroughly, since the normal esophagus does not harbor great numbers of bacteria, particularly when the mouth and throat are clean. When the esophagus is suspected of being bacterially befouled, the patient may be given mulyptol lozenges and directed to dissolve one in his mouth, hourly, for a day previous to coming for study.

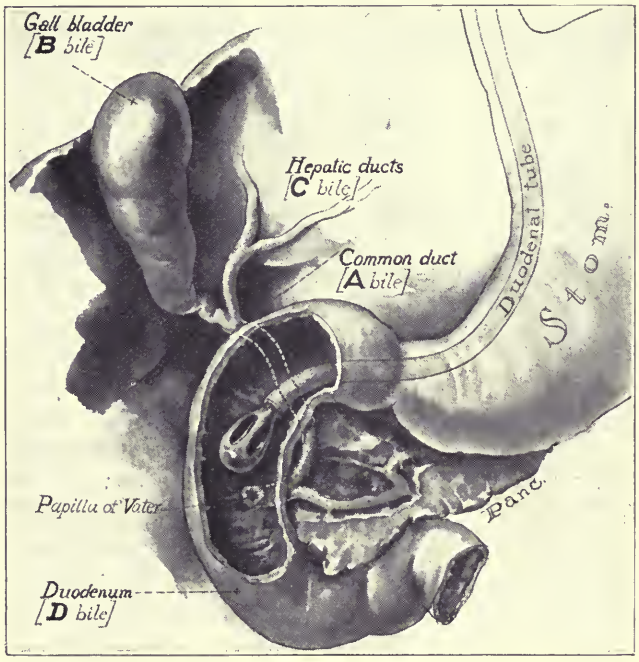


Fig. 2. Sketch detailing sections of duodenum and biliary tract in relationship to bile fractions secured upon non-surgical biliary tract drainage. *D*, duodenal fraction; *A*, common bile-duct fraction; *B*, gall-bladder fraction; *C*, fraction from hepatic ducts and their radicles. (Drawn by Tom Jones).

bulb may be directly passed to the stomach by the obturator of a Kanaval tube. When the bulb is in the stomach, lavage is performed, with an abundance of sterile water at 80° F. (26.11° C.), and this lavage is followed by a second lavage with hot 3 per cent liquor antisepticus solution, until the fluid returns perfectly clear and free from mucus or epithelial sediment. The esophagus can be relatively sterilized by lavage with water and liquor antisepticus as the

When the stomach has been cleaned, the patient, lying in the right Sim's position, swallows from 10 to 20 cm. more of tube, in order that the duodenal bulb may pass through the pylorus. In the average subject, this occurs in from a few minutes to one and one-half hours. Where obstinate pyloric spasm holds the bulb in the stomach, the author has found that its passage is facilitated by passing through the tube to the stomach, from 1 to 2 drams (3.8 to 7.6 c. c.) of a 20 per cent

solution of benzyl benzoate in 2 ounces of sterile water or 20 drops of tincture of belladonna. The entrance of the bulb into the duodenum is proved fluoroscopically, by the constant aspiration of pearly-gray, alkaline, pancreatic juice, often bile-tinged, by the peristaltic "tug" of the active duodenum, or occasionally, by the patient's subjective sensations of the bulb passing the pyloric sphincter, or of its lying outside the gastric zone. With the duodenal bulb at an optimum of from 10 to 15 cm. beyond the pyloric ring (that is, just beyond the average distance from the pylorus of the entrance of the common bile duct into the duodenum), lavage with sterile water at 80° F. (26.11° C.) and later a 3 per cent solution of liquor antisepticus, is carried out until perfectly transparent, sediment-free duodenal residues are returned. The author has not considered it advisable to complete the duodenal lavage with the astringent solution (so-called "lavoris") suggested by Lyon. It has seemed to him that the introduction of a nostrum such as this were not good practice, and especially, because the action of such an astringent as zinc chlorid upon the duodenal mucosa, might interfere with the action of magnesium sulphate.

The patient is now ready for the introduction of the magnesium sulphate solution. It is the author's custom to introduce slowly, through the duodenal tube by means of a sterile syringe, 25 c. c. of a 33 per cent water-solution of magnesium sulphate at a temperature of 85° F. (29.44° C.). This solution is allowed to remain in the duodenum from one to three minutes and is then slowly aspirated by means of a glass syringe. It is commonly clear and bile-tinged immediately; later, if the common bile-duct is patent, it becomes definitely so. This material is tested for alkalinity by Toepfer's reagent, and, if alkaline, it is placed in a separate sterile container, marked "D"; this is sent to the laboratory and examined for pus, blood, mucus, epithelium and bacteria. If patients are not examined after a twelve-hour fast, or if gastric irritablity has resulted in continuous secretion, the duodenal extracts may persistently return opalescent. This is due to precipitation of bile-salts by hydrochloric acid. It seriously interferes with study of the specimens segregated from the several segments of the biliary tract.

(2) *Significance of Aspirated Fractions.*—In normal subjects, following withdrawal of the magnesium sulphate solution, there results a characteristic sequence of events, provided careful and frequent aspiration be continued. *First,* there are secured from 2 to 15 c. c. (32.4 mimims to 4.06 fluidrams) of thin, light, golden-yellow bile, which quantitatively (and if further proof be needed, cytologically), evidently comes from the common bile-duct. This is collected in a sterile container for study and marked "A". As the common duct bile-flow ceases, normally, it is possible readily to aspirate, and with rather surprising suddenness, from 1 to 3 ounces of thick, syrupy bile, fairly clear and of a brownish-gold color, a color usually deeper than that of bile obtained from the common duct. Cytologically (from the presence of columnar epithelium), in view of its quantity, and from the observation that after cholecystectomy this sudden gush of a large volume of dark colored bile is not secured, it is evident that this material comes from the gall-bladder. This specimen is also collected in a sterile container and studied, marked "B" bile. This abundant gall-bladder flow usually ceases abruptly. If aspiration be diligently continued, there follows a varying quantity of normal-appearing, thin, clear, light golden-yellow bile, which, cytologically, can be shown to be hepatic-duct and freshly secreted liver bile. It is thus apparent that the characteristic sequence of events described, permits, by Meltzer's method, reasonably accurate, gross segregation of biles from the duodenum ("D" bile), from the common duct ("A" bile), from the gall-bladder ("B" bile), and from the hepatic duct and liver ("C" bile). The specimens obtained from these segments of the biliary passages can be further and more *definitely differentiated* by microscopical examination. Inasmuch as disease of the liver and biliary tract produces altera-

tion recognizable in the bile bathing them, each bile specimen must be studied with respect to color, quantity, rate of flow, consistency, transparency, the presence of gross mucus, pus, blood and calculi. *Microscopically,* observations are made with respect to determine, not only the *location* of biliary tract affections, but also to add valuable information with regard their *ctiology,* and the *variation* in their degrees and kind in the several segments of the bile-tract and liver.

1602 N. Deerborn Street, Chicago

GALL-TRACT DRAINAGE

Name Mr. Albert S. Case No. a3371.

Address Chicago Place Room 4 Date 2/11/21

Physician S.K.E.&O. Acute, Subacute or Chronic Fever, Jaundice Colic

Diagnostic Therapeutic Hospital No. Office Case No. of Drainage 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Anti-spasmodic Given			Anti-spasmodic Repeated		
Nature	Time	Amount	Nature	Time	Amount
Belladon	9⁰⁰	10 minim			

Mg. SO. Given				Mg. SO. Repeated			
Amount	Strength	Temperature	Time	Amount	Strength	Temperature	Time
60 c.c.	1/3	Hot	10¹⁰				

Mg. SO. Aspirated			Mg. SO. Re-aspirated		
Amount	Color		Amount	Color	
30 c.c.	Bile Stained				

Tube passed 10⁰⁰ a.m.

Condition Duodenum Spastic

Blood Present Pin head Character clots. Amount Few.

General Description Final Drainage See Over.

Duodenal Lavage (Hot Liquor antisep. alkalin)

After Care Sodium Salic & Ox Gall - Routine Diet (Low protein Low fat)

Clinical Diagnosis Cholecystitis - Choledochitis - Duodenitis

Spontaneous Drainage: Amount 35 c.c. Nature Duodenal Bile

Laboratory Findings: Microscopical Yeast ++. B. Coli ++++ Blood Agar

Bacteriological B. Coli only.

Fig. 3*a*. Specimen of author's record form for use in non-surgical biliary tract drainage. (Original).

Nature of Observation	"D" Bile		"A" Bile		"B" Bile		"C" Bile	
	Gross	Microscopic	Gross	Microscopic	Gross	Microscopic	Gross	Microscopic
1-Quantity	150 c.c.		10 c.c.		350 cc			None
2-Rate of flow	Rapid.		Rapid		Slow.			
3-Color	Lt. Amber		Amber		Dk. Brown			
4-Odor	Usual.		Usual		Usual			
5-Consistency	Mucoid		Watery		Mycoid			
6-Transparency	Opaque		Translucent		Opaque			
7-Mucus	+ +		+		+			
8-Pus	0	0	0	0	0	0		
9-Blood	0	0	0	0	0	0		
10-Calculi		0		0	Gritty to touch	Sand.		
11-Cytology		Few Epith. Cells		Few Epith. Cells		Fragments Gall Bladder Epithelium		
12-Organisms		B. Coli.		B. Coli.		Cocci & B. Coli		
13-Crystals		0		0		Cholesterin		
14-Cultures						B. Coli only		
15-Flocculi	+ +		0		+			
16-Sediment	+		Slight		+			
17-								
18-								

Observer L. L. E.

Fig. 3*b*. Obverse of Fig. 3*a*.

the finding of pus, mucus, blood-cells, bile pigment, crystals, epithelium, microörganisms, bits of mucus, and epithelial débris; the fluid biles are later cultured in blood agar, plain agar, glucose broth and bouillon.

By this intensive and special segmental study of bile removed directly through the duodenal tube, it is practically possible to

Part III.

Material.—In the author's clinic, direct biliary tract aspiration has assumed the position of the most useful procedure at his command in the elucidation of pathologic processes associated with dyspepsias more or less sharply defined as being of extra-gas-

tric origin. In patients affected with frank gastric or duodenal ulcers, he has come to consider it necessary to study the state of the biliary tract before he considers it possible to properly advise or direct treatment. Following operations upon the gall-bladder, cholecystectomy or cholecystostomy, from the information secured by the study of bile directly obtained from the biliary tract, it has become constantly more evident that, frequently operative measures directed toward the gall-bladder have eradicated only a portion of the disease; they have been incomplete because, associated with the local gall-bladder pathology, there has simultaneously existed infection of the bile-ducts, even so far as their small ramifications in the liver.

It might be mentioned here that of patients upon whom gall-bladder operations had previously been performed and who later appeared with dyspepsia, the author's bile studies indicate, that, in more than 70 per cent of instances, *inflammation* with *infection still persisted* in the large or small bile-ducts.

To date, the author has made observations upon approximately 650 direct non-surgical, biliary-tract drainages in 300 patients. In each patient diagnostic drainage was performed and in a number of patients repeated drainages were instituted as a method of treatment. While it is not possible at this time to consider each patient separately, yet, it would seem useful to call attention to certain important phases of the work.

(1) *Failure to Secure Biliary-tract Aspirates.*—In rather less than 11 per cent of patients (even when the histories and physical examinations pointed to no obstructive lesion in the biliary tract), it was not possible to secure bile from the biliary tract at first attempt. The causes for this failure appear to be: (*a*) marked pyloric or duodenal spasm causing incomplete passage of the duodenal bulb or occlusion of its perforations, (*b*) kinking of the duodenal tube, (*c*) failure of the bulb to lie in proximity to the papilla of Vater (either considerably above it or far below, the bulb then passing to the jejunum), (*d*) failure of the magnesium sulphate to arouse Meltzer's duodenal reflex (faulty innervation, chronic atrophic duodenitis, backflow of magnesium sulphate into the stomach, rapid escape of magnesium sulphate from the duodenum as result of vigorous local peristalsis [?]), (*e*) occlusion of the papilla of Vater, or of the pancreatic, common bile, cystic or hepatic ducts from thick bile or mucus, calculi, new growths, adhesions, twists, kinks, external pressure or acute inflammatory disease, or (*f*) to not-yet-understood, inhibitory, secretary reflexes (excitable women with headaches, advanced aesthenia, etc.). On the second or third attempts in the groups above described, the percentage of unsuccessful aspirations was reduced to about four. It is quite likely that this failure arose from errors in technic or to the choosing of cases which were not suited to the method.

(2) *Selection of Cases.*—As a result of the author's experience, the opinion is ventured that, except in rare instances (acute obstruction, perforation, marked inanition, etc.) operative procedures upon the biliary tract are not justified without previous diagnostic biliary tract aspiration. Such aspiration, properly performed, permits the surgeon to prognose in a striking fashion, before laparotomy, the condition which operation will disclose. Instances are of common enough occurrence, where the pre-laparotomy knowledge of the state of affairs in the biliary tract, proves of the greatest value with respect to the planning of operative procedures, rapid and efficient technical manouvers, and the prognosis with regard to post-operative course. Certainly, it is of practical use for a surgeon to know previous to operation that a common bile-duct is free from obstruction, inflammation or infection, but that the cystic duct is occluded or that a gall-bladder, enlarged and static, is filled with infected bile or again, that little disease exists in the common duct or gall-bladder, but that the hepatic duct and its radicals are definitely and extensively involved. Striking though it may seem, properly conducted biliary tract aspiration after the

method of Meltzer, enables the pre-laparotomy determination of facts such as these to be almost consistently possible. Furthermore, it is valuable information for a surgeon to know that removal of an infected gall-bladder will not constitute a complete and satisfactory surgical operation when there are to be left behind infected bile-ducts. Not rarely, the pre-laparotomy knowledge of such extensive infection will determine the operative procedure,—the alert surgeon will not simply remove a gall-bladder, and then sew up the ducts and the abdominal wound tightly, but, rather, he will perform cholecystostomy and insist upon drainage prolonged until cytologic and cultural examination of excreted bile show that inflammation in the common duct and the hepatic duct radicals has subsided.

(3) *Interpretation of Biliary-tract Aspirates.*—The constant securing of duodenal residues without common-duct bile indicates obstruction at or hepatad the papilla of Vater. If, in association with this finding, there are clinically jaundice and large gall-bladder, it is evident that obstruction is in the common bile-duct, at, or distal to the cystic duct. If bile from the common-duct and the hepatic ducts is obtained, with absence of gall-bladder aspirate, and there is an associated gall-bladder tumor, or fulness, or palpation-tenderness, it is evident that the cystic duct is obstructed. If biliary tract aspiration returns but a small quantity of common duct and gall-bladder bile, but no hepatic duct bile, or shows hepatic duct bile loaded with blood, pus or precipitated bile salts, it should not require laparotomy to demonstrate that there exists serious liver and biliary tract malfunction (commonly. calculi with infection), against which surgical procedures carry little hope. The securing of normal common duct bile, but altered gall-bladder bile, or a quantity greater than 100 c. c., points to dilatation of the gall-bladder, with bile stasis and usually infection. In some instances, the constant, gall-bladder residue may be strikingly increased; from one of the author's patients were secured more than 2 liters of foul, muco-purulent, greenish-black, gall-bladder bile, laden with epithelial débris, cholesterin, bile-pigment, colon bacilli and streptococci. In this patient, duodenal, common duct and hepatic duct bile were practically normal. The withdrawal of large quantities of bile from the gall-bladder can not infrequently be proved to coïncide with disappearance of right upper quadrant tumor and very definite alterations in the size of the liver. Further, it should be a rule in all hospitals and clinics, that no patient upon whom cholecystectomy has been performed be discharged from a surgical service without first having a diagnostic biliary tract aspiration. The author's work proves that there certainly are many cholecystectomized patients discharged from hospitals who still have active infection in the bile passages; in such circumstances only a limited prognosis with respect to permanency of good health can be given. As an operation, cholecystectomy can be considered a successful procedure, only when biliary-tract aspiration, *subsequent to the operation,* returns bile which is normal, cytologically and bacteriologically. Similarly, when cholecystostomy is performed, and drainage instituted, it would seem unwise to permit drainage to stop, so long as bile, showing active infection and evidences of inflammation, is being discharged.

(4) *Failure of Non-surgical Biliary-tract Drainage to Indicate Anomalies When Definite Pathology Exists.*—In a study of 1000 operatively demonstrated instances of gall-bladder disease, which the author reported more than four years since, examination of freshly secured bile showed active infection in 28.6 per cent of cases. By culturing the bile, however, and allowing sufficient time for attenuated bacteria to grow, it was shown that a total of rather more than 63 per cent of biles contained viable bacteria. These figures were returned from practically all types of gall-bladder disease; in 57.4 per cent of cases the ailment was as pathologically chronic as in the calculus or the neoplasm stage. From the foregoing facts, it is evident that in biles secured from *gall-bladders where pathology is advanced suffi-*

cient to warrant surgical intervention, it is to be expected *that if bacterial growths are to be looked upon as the sole evidence of disease*, non-surgical biliary-tract aspiration will return no proof in approximately 37 per cent of cases. The author's studies have shown, however, that, even when the aspirated gall-bladder biles have returned no positive bacterial cultures, evidences of disease commonly were not lacking, provided careful search for such was made. In these circumstances, the more important anomalies were: (*a*) the securing of greater than 100 c. c. of gall-bladder bile, the quantity recovered averaging 292 c. c., the maximum being 2800 c. c.; (*b*) abnormal gross appearance of bile secured (even though quantity be not greater than 100 c. c.), bloody, dark-colored, turbid, thick mucoid bile of high specific gravity, with heavy, sometimes gritty, sand-like sediment; (*c*) recovery of small calculi; (*d*) on microscopical study, pus, desquamated, flat-columnar epithelium, excess cholesterin, soaps, bile-salts, and mucus, rarely, cells showing atypic nuclei in malignant disease. Perhaps the author's experience is not as yet sufficiently extensive, but he is of the opinion as a result of his studies, that in practically all instances in which the gall-bladder is so diseased as to cause symptoms, biliary tract aspiration will return definite evidence of such, by careful observation of the volume, and kind of biles secured segmentally. Even in those infrequently occurring cases of pericholecystitis, in which the gall-bladder or duct mucosa are not damaged, there are few instances where the aspirated bile is normal, quantitatively, grossly and cytologically. As has already been mentioned, if the common bile, cystic or hepatic ducts are occluded from any cause, study of bile from hepatad portions of the biliary tract is not possible, even though could it be secured, it might show readily demonstrable anomalies. In such circumstances much diagnostic information is secured, however, by *proving the absence* of one or all the fractions normally secured from the several biliary tract segments.

In the author's experience, there are very few patients in whom the *gall-ducts* are diseased, where aspiration of bile fails to return evidence of that disease. The author's work indicates that more commonly than has been considered, bile-duct inflammation, imperfect emptying or distension exist, in association with, or independently, of gall-bladder pathology. Indeed, instances are common enough, where the gall-bladder ailment has been considered the source of pain and dyspepsia, and yet bile-tract aspiration indicates normal gall-bladder but very definite pathology in the common bile and hepatic ducts. The average quantity of bile removed from the common duct was 33 c. c.,—the maximum 175 c. c. In 33 per cent of cases, in which the gall-bladder-bile was in every way normal, the duct bile presented definite evidences of disease.

(5) *Biliary-tract Aspiration Showing Disease in Cases in Which no Direct Clinical Evidence Points to Such Upset.*—From patients affected with obscure "toxic" or roughly-called "metabolic" disturbances; from instances of rheumatoid arthritis and periarticulitis in which all external infectious foci have been eradicated with no halting of the disease; from subjects with chronic heart lesions—muscular or valvular—aggravated by extra-gastric types of dyspepsia; from cases of advanced anemia (pernicious, "hemolytic" or "chlorotic"), of indefinite cause; from patients, the victims of "migrain", with or without dyspeptic storms; from cases of cirrhosis of the liver, often with portal embarrassment and splenomegaly; from patients affected with epilepsy or epileptiform attacks, commonly preceded or accompanied by digestive upsets; and from the subjects of colitis, associated with irregular periods of intestinal stasis or diarrhea, the author has proven by biliary-tract aspiration, that quite commonly definite—often very extensive—pathology existed in gall-bladder, common or hepatic ducts or the finer radicals of the latter. He is convinced that in the above groups of ailments there lies an important field for investigation, along lines of diagnosis and, possibly, therapy. At present, non-surgical biliary tract drainage offers

the only way by which such investigation can be carried on.

(6) *Macroscopic Abnormalities of Bile Secured by Meltzer's Method.*—(*a*) Any constantly *alkaline,* duodenal aspirate which is clouded, turbid, blood- or pus- or mucus-laden can be considered as coming from an abnormal duodenum,—the seat of ulcer or chronic inflammation. (*b*) An alkaline, common bile-duct fraction of greater volume than 15 c. c. suggests local stasis; if the bile is turbid, of specific gravity greater than 1015, exhibits gross blood, pus, crystals, calculi, strings or flocculi of mucus and on standing deposits an abundant sediment, it means duct disease. (*c*) Gall-bladder bile fractions of more than 100 c. c. and with specific gravities higher than 1020 are abnormal; they indicate bile stasis. When these fractions likewise exhibit foul odor (the musty, penetrating colon type of infection is readily recognized), gross blood, pus, "sand", mucus-gobs or abnormal color, there is little doubt of the presence of active disease in that portion of the biliary tract whence they came. The quantity of gall-bladder bile may be astonishingly large—more than 2800 c. c. in one of the author's cases. The *color* (at the time of the aspiration) varies from yellowish brown or green to pitch black, with a *consistency* of thick paste or glue. In five instances the author has aspirated pure, greenish yellow pus. In 17 aspirates, the gall-bladder fraction showed abundant blood, and in these cases blood occurred in that fraction only. In 26 gall-bladder aspirates, definite, "sand-like" sediments quickly formed on standing; sometimes such sediment equalled as much as a twelfth the volume of all the bile obtained. *Hepatic duct* bile shows the fewest gross anomalies except in quantity; it is a curious phenomenon, in that even when the normal 5 to 15 c. c. of bile have been secured from this portion of the hepatic duct tree, not rarely there follows an abundant flow of seemingly grossly normal bile—in some instances this amounts to a veritable hepatorrhea, a liter or more of grossly normal liver bile being readily collected. In 2 of the author's cases, so-called "white bile" in greater than 500 c. c. quantity was secured. The author is not able to offer an explanation for this. When coming from *diseased* hepatic ducts and their liver ramifications, the bile is thick, turbid, of specific gravity higher than 1015, mucoid, slow-flowing and rich in sediment, exhibiting pus, blood, mucus and crystals. It may have foul odor, *i. e.,* typhoid and colon bacilli carriers.

(7) *Microscopical Study of Fractional Bile-tract Aspirations.*—Specimens must be studied very soon after they have been secured, if one is to obtain full information. Disintegration of the formed elements of bile occurs rapidly. Tardy examinations, microscopically, yield only imperfect or partial facts. If specimens cannot be studied at once, they should be sealed in test-tubes and kept in an ice-box until it is convenient to make the necessary examinations.

Smears from each segmental biliary-tract bile fraction are prepared. For securing information regarding crystals and pigment, a set is prepared unstained. For the study of epithelium, pus, blood-cells, bacteria and fat a set is prepared and stained with polychrome methylene-blue, Wright's or osmic acid. All microscopic specimens are studied with high power, oil-immersion lens. The unstained specimens should be examined by indirect light.

By way of interpretation it may be said that in normal duodenal fractions, one obtains a few epithelial cells, an occasional leukocyte, pus or blood-cell, a small quantity of bile constituents with a few bacteria (often colon type or cocci.) In disease, epithelial débris, pus and blood, bacteria-laden mucus, and numerous microörganisms are markedly increased, particularly in the subacute or the acute infectious ailments. *Common duct* bile fractions, in normals, usually contain an occasional flat, columnar epithelial cell, a few fat needles and leucin or cholesterin crystals; in disease, epithelial placques, phagocytic polynuclears, germ-infiltrated mucus, masses of bile pigment, clusters of cholesterin and enormous numbers of bacteria are readily seen. When the

gall-bladder bile is normal, small clumps of crystals, bile pigment and epithelial débris with a few bacteria can be observed. In gall-bladder disease, the microscopical picture is striking—even more striking than is that of a urine secured from a badly infected urinary bladder. In such circumstances, the field may swarm with bacteria (some of the author's specimens resembled the hanging-drop examination of a bouillon culture), or be covered by great masses of degenerating epithelium, bile-like deposits of cholesterin and leucin, clumps of mucus infiltrated with pus and blood-cells and bacteria, or irregular masses of precipitated bile salts and fat. It has often been observed that bile which did not appear exceptionally abnormal in quantity or kind on gross examination, exhibited most marked evidences of gall-bladder disease, when properly prepared smears were studied microscopically. *Hepatic duct and liver* bile fractions less constantly show anomalies than do bile from other biliary tract segments. In normals, the microscope may show nothing more than an occasional crystal, leukocyte or bit of bile pigment. Where hepatic duct or liver infection is present, the microscopical field generally swarms with microörganisms, and is thickly covered with pus, blood, crystals and pigment. It might be valuable to emphasize here, again, that the hepatic duct and the liver radicals are much more commonly involved in choledochitis and cholecystitis than has been formerly thought. This observation aids in explaining the failure of a certain group of patients to make satisfactory recovery following the most expert technical surgery directed toward gall-bladder and ducts only.

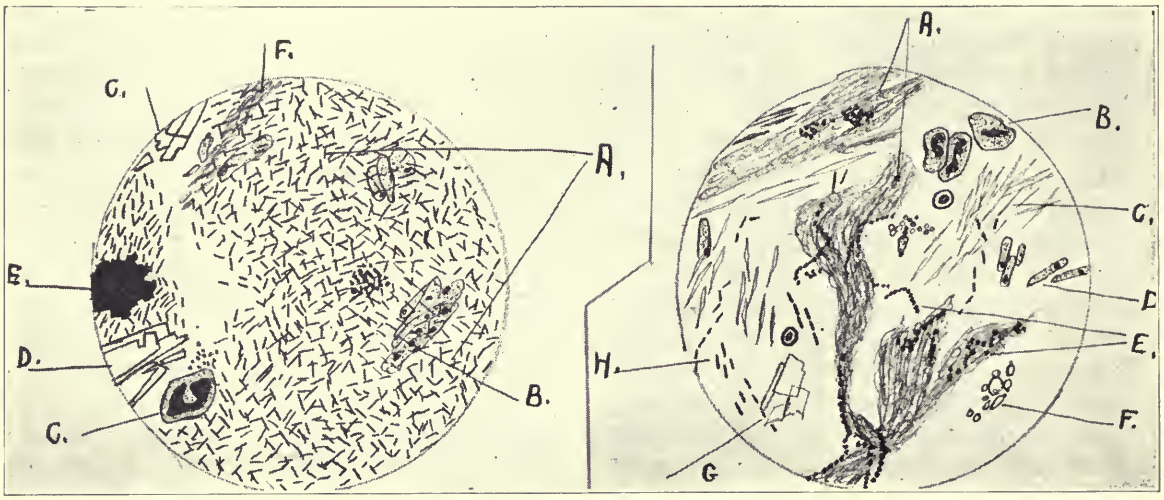


Fig. 4. Mrs. W., clinically, obscure anemia of "secondary type", with dyspepsia. *A*, enormous mass of colon group bacilli in almost pure culture; *B*, desquamated gall-bladder epithelium; *C*, polynuclear leukocyte; *D*, masses of cholesterin; *E*, collection of bile salts; *F*, budding yeasts. (Drawn from fresh specimen by author).

Fig. 5. Mrs. Wa., clinically, "pernicious anemia". NOTE—*A*, mucus mass, bacteria-laden; B, polynuclear leukocytes; *C*, mass of soap needles; *D*, desquamated epithelial cells; *E*, streptococci, chains and groups; *F*, budding yeasts; *G*, cholesterin plates; *H*, bacilli of colon group, chains and singly. (Drawn from fresh specimen by author).

(8) *Cultural Studies of Aspirated Bile.*—Each fractional specimen of aspirated bile should be cultured on several kinds of medium, even when grossly and microscopically the bile presents no striking anomalies. In this paper the author has already called attention to the observation made in his clinic that although but 28.6 per cent of biles in a

large series exhibited bacteria on *direct smear*, yet *on culture* 63 per cent of such biles gave growths. No further comment is needed to emphasize why cultural study of the aspirated fractions is necessary.

Bile implants should be made in bouillon, on plain and blood agar, in glucose broth and on modified Drigalski-Conrado media. Further, inasmuch as it seems to us that, not rarely, certain bacteria in bile are attenuated, sufficient time should be permitted to elapse before a culture can be said to be blank—certainly, from a week to ten days is not too long a growth period. After cultures have been examined microscopically by direct smears, growths should be preserved or transplanted with the object of later preparing autogenous vaccines.

In the author's series he has recovered by culture, in the order of their incidence, the following organisms: colon type bacillus, streptococcus, colon-typhoid group, staphylococcus, influenza-like bacillus and coccus, micrococcus catarrhalis, diplococcus, and diphtheroid bacillus. Apart from cultures the gall-bladder fraction of bile contained small form yeasts seven times and flagellate protozoa five times.

In the author's series there were 22 per cent of biles, atypic so far as quantity, cytology and crystalline deposit were concerned, from which he recovered no growths on culture. This is a useful fact, not only because it shows that definite damage may exist in biliary tracts when viable bacteria are not demonstrable, but also since it proves that alimentary tract contamination of aspirated bile may be prevented when proper care is taken.

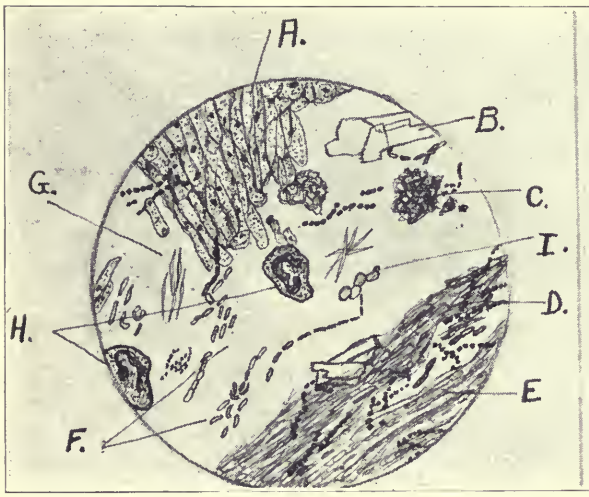


Fig. 6. Mrs. C., clinically, "pernicious anemia". NOTE—*A*, epithelial plaque (cells of columnar type: gall-bladder lining); *B*, cholesterin crystals; *C*, bile salts and pigment; *D*, chains of streptococci; *E*, mucus mass; *F*, bacilli (colon group); *G*, soap needles; *H*, polynuclear leukocytes; *I*, red blood-cells. (Drawn from fresh specimen by author).

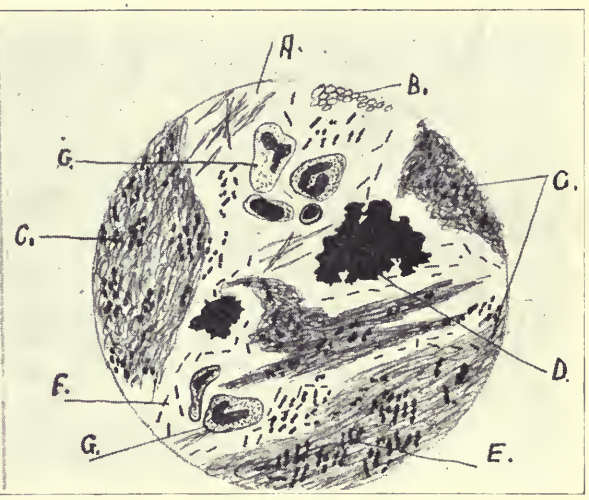


Fig. 7. Mrs. G., clinically, "rheumatoid myositis" of obscure origin, dyspepsia of long standing, anemia. NOTE—*A*, soap needles; *B*, yeast colony; *C*, great masses of bacteria-laden mucus; *D*, large mass of bile salts; *E*, colonies of diplococci; *F*, colon-group bacilli; *G*, polynuclear leukocytes. (Drawn from fresh specimen by author).

PART IV.

(A) *Non-surgical Biliary Tract Drainage as Part of a Therapeutic Regimen in Ailments of the Bile-passages and the Liver.*—In such abnormal states, the function of all treatment should be to prevent stasis of bile in any or all parts of the biliary tract and

liver, to eradicate infection—constantly present or recurring intermittently—and to aid in repair of damage produced by bile stasis and infection.

Instances are of sufficiently frequent occurrence in which infection, inflammation and bile stagnation have caused such pathologic change as to call for early and radical mechanical relief by surgery. It is a mistake to offer relief for such conditions by non-surgical measures: while trial of various agents is being made, serious damage may ensue—even to malignancy—in bile-passages and liver. This must not be forgotten by those enthusiasts who see possibilities in clinical therapeutics in the Meltzer non-surgical biliary-tract drainage. If this is forgotten, the method will fail in serving as a valuable addition to our therapeutic armamentarium.

All who have had actual experience with the Meltzer method agree that by this method one is able to recognize disease of the biliary tract earlier than by any other clinical procedure. Since this is true, then by careful regimen, it would seem that we have an opportunity to directly treat liver and bile passage affections before they have become sufficiently advanced to produce malformations, obstructions, calculi or malignancy. Such should be possible in many patients by taking those instances in which the ailment is not far advanced, and by preventing bile stasis and by eradicating infection, thus permitting injured mucus membranes, muscle layers and serosa to heal. In the author's clinic, he has endeavored to carry out such line of treatment.

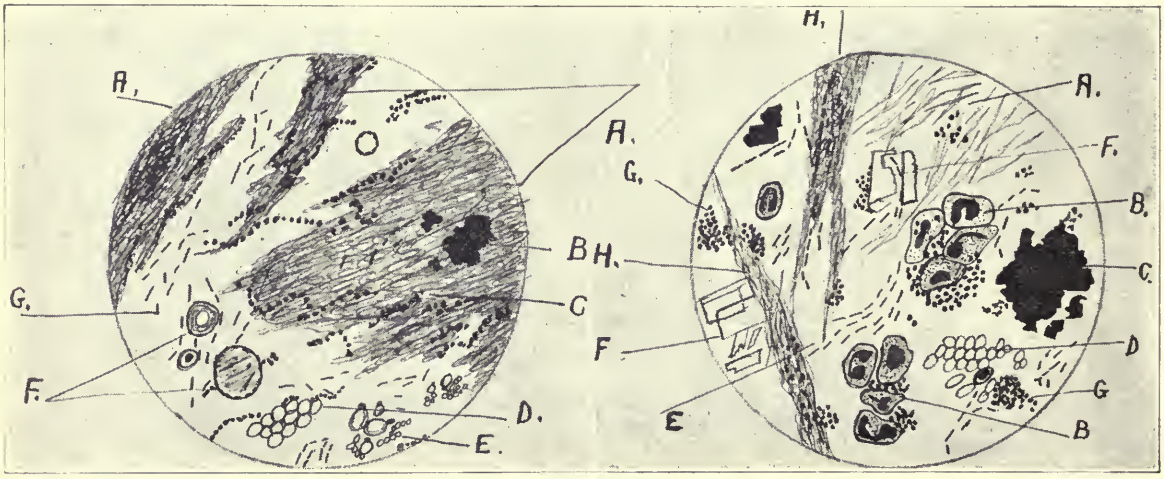


Fig. 8. Mr. Co, cliinically, dyspepsia of extragastric etiology. Note—*A*, thick masses of mucus, laden with bacteria; *B*, amorphous bile salts and pigment; *C*, streptococci in mucus; *D*, red blood-cells; *E*, budding yeasts; *F*, leucin; *G*, bacilli of colon group in short chains and singly. (Drawn from fresh specimen by author).

Fig. 9. Mrs. F., clinically, pyloric spasm in association with cholecystitis. Note—*A*, great masses of soap needles; *B*, groups of phagocytic polynuclears; *C*, bile salts and pigment; *D*, red blood-cells; *E*, bacilli chains and small groups; *F*, cholesterin, much increased in amount over normal; *G*, staphylococci; *H*, mucus, with inter-mixed bacteria. (Drawn from fresh specimen by author).

Classes of Patients.—The author has found the method useful in patients ill as follows:

(1) Acute, infectious choledochitis or cholecystitis, frequently in association with acute, infectious ailments, as pneumonia, pleurisy, la grippe, tonsillitis, etc.

(2) Acute toxic cholecystodochitis and hepatitis, with jaundice and large liver: ptomain poisoning; arsenobenzol poisoning.

(3) Biliary stasis—with or without active, acute or subacute infection—in association with acute or chronic heart disease: a class in which the risk of surgery is great and yet dyspepsia and abdominal distance demand relief. This group of patients has frequently been commented upon, particularly by Babcock and by Reisman.

(4) Biliary-tract stasis and infection in the liver cirrhoses—acute or chronic.

(5) Biliary-tract statsis, infection and intoxication in the severe anemias, particularly "hemolytic" or "pernicious" anemia, leukemia, Banti's syndrome, chlorosis.

(6) Dyspeptic storms, "biliousness", in conjunction with migrain, epilepsy, etc.

(7) Chronic or acute rheumatoid infections, where all extra-abdominal foci of infection have been removed, and yet the progress of the disease not appreciably halted.

(8) Biliary-tract and liver stasis and infection in association with diabetes, where operation is either attended by grave risks or is impossible.

(9) Empyema of the gall-bladder with acute duct infection, where surgery is not available, warranted or is attended by very serious prognosis.

(10) Duodenal or duodeno-pyloric ulcer, frequently recurring, particularly when occurrences coïncide with "bilious" or atypic ulcer attacks, and where proper surgery is not available, is not permitted or the subject is unsuited.

(11) Dyspepsia of biliary tract origin in patients affected with serious endocrine disturbances, particularly Grave's disease, toxic fetal adenomata, pancreatitis, Addison's disease; or in patients who are unable to undergo further surgery than that, for example, on the thyroid.

(12) Patients with intestinal stasis, with recurrent biliary-tract type of dyspepsia and "mucus colitis."

(13) As previously mentioned, following operations upon the gall-bladder and gall-ducts the detection and eradication of infection is possible by no clinical procedure other than trans-duodenal drainage.

(14) Secondary acute or subacute biliary tract infection in individuals with acute mastoid, middle ear or cerebral disease.

(15) Subacute, non-obstructive, non-calculus choledochitis, pancreatitis, cholecystitis.

(16) Gall-bladder stasis, acute or chronic, not complicated by calculi and duct obstruction.

(B) *Method of Employing Non-surgical Biliary Tract Drainage in the Treatment of Suitable Cases.*—(*a*) To Relieve Stasis Existing in Gall-ducts, Gall-bladder and Liver.—Accordingly as bile stasis can be proved diagnostically to exist in gall-bladder, common duct or liver radicals, trans-duodenal drainage is instituted daily at intervals of two or more days. To facilitate matters, it is advisable—but not absolutely necessary—to have the patient in the hospital during the first two or three weeks of the treatment period. Biliary-tract drainage is continued until bile, as nearly as possible normal, grossly, cytologically, and culturally, is secured from each segment of the biliary tract. Cases are of frequent enough occurrence in the routine carrying out of this work, in which a gall-bladder or a gall-duct initially rich in bacteria, pus, crystals and epithelial débris, returns practically normal bile fractions from each segment of the biliary tract in from three to six aspirations.

After each biliary tract aspiration, the duodenum is thoroughly lavaged through the Rehfuss tube with several liters of a 3 per cent liquor anticepticus solution. After the lavage, before the tube is withdrawn, an ounce of castor oil or 2 drams of old-fashioned bitter extract of cascara sagrada is injected into the duodonum. This is done in order that bacteriologically foul bile freshly excreted from the papilla of Vater and not perhaps secured by aspiration through the duodenal tube, may not remain in the small or large gut as a possible source of infection to injured mucosa. Before this procedure was adopted, the author had several patients in whom, following biliary tract aspiration, it seemed that an acutely appearing toxic state came from infected bile in the lower bowel, and not from, as he had first thought,

the patient's having an idiosyncrasy with respect to magnesium sulphate.

Following therapeutic biliary tract aspiration, the patient is kept on very soft or liquid, low protein and low-fat diet for from eighteen to thirty-six hours. Frequent, small feedings are advised in order that by stimulating from within the duodenum the demand for bile, physiologically, the liver and biliary tract may be kept empty. The author thinks it best to limit the protein and the fat of the diet in order that digestive demands upon the liver itself and the upper alimentary tract should be reduced to the minimum. With such physiologic rest, healing of injured mucosa, glands and muscle layers may probably be accelerated.

In the thirty-six hours subsequent to the non-surgical drainage of the bile passages, the author administers from 75 to 100 (4.86 to 6.48 grams) of sodium salicylate in broken doses. While salicylates are probably excreted by the liver and hence may exert a certain local anti-bacterial influence in the bile passages, the extent of such excretion and antisepsis is problematical. The object in exhibiting a large dose of salicylates is to secure action antagonistic to bacteria in the wall of the bile-passages and in the liver at a time when the systemic circulation is least embarrassed locally. Inasmuch as experimental evidence and the author's own experience indicate that from the bile and from the duct walls in nearly 70 per cent of the cases of biliary tract disease, cocci may be recovered and these cocci are of the so-called "rheumatoid" group, salicylates are exhibited to act against such organisms, after the fashion in which this remedy acts in rheumatoid disease wherever it may be located.

(*b*) To Eradicate Infection in Biliary Tract and Liver.—Frequent trans-duodenal aspirations systematically carried out with after-care as above described, have certainly proved valuable aids in the author's experience to promote healing of infections in liver and bile-tract. Where infection is acute, or subacute, the fight against it is more successfully waged, if, at the diagnostic aspiration, the bile is carefully cultured and from the growths autogenous vaccines are prepared. Such autogenous vaccine may be injected in increasing amount (from an initial 250 millions upward) every fifth day. This therapy would appear to be of especial service in mixed infections and in chronic typhoid and colon bacillus carriers.

(*c*) Where Gall-tract Inflammation Is Chronic and of Low Grade or Is Intermittently, Acutely or Subacutely Active; Post-operative Biliary Tract Infections.—Even when the patient seems to be progressing in a fairly satisfactory fashion, in the presence of a known gall-bladder, duct or liver malfunction, it is advisable systematically to perform diagnostic transduodenal bile-tract aspirations several times yearly. By this means, one can be at all times sure of the status of his patient and, should the aspirations indicate a recurrence of disease, measures suitable to the affair at hand may be instituted before an acute crisis develops or previous to the time when gross pathologic anomalies have seriously damaged the ducts, the gall-bladder or the liver functionally.

As we have already mentioned, no patient upon whom cholecystectomy or cholecystostomy has been performed should be discharged from the physician's care until billiary tract aspirations indicate absence of infection and the presence of permanent healing. Even after such proof has been secured, it would seem advisable, (in view of what the surgeons have taught us to expect in regard to anatomic alterations following operations upon the gall-bladder) to insist that every operated patient have diagnostic bile-duct aspiration twice yearly postoperatively. McCarty's recent study (yet unpublished) upon hepatitis in association with the various forms of choledochitis certainly indicates that, if serious damage to ducts and liver is to be prevented, we must have a means at our demand for the clinical recognition that such disease exists together with a method of therapy which can be actively directed against the known seat of disease.

PROGRAM

THE AMERICAN CONGRESS ON INTERNAL MEDICINE, FIFTH ANNUAL MEETING, BALTIMORE, MD., FEBRUARY 22 TO 26, 1921 HEADQUARTERS, HOTEL BELVEDERE

SYNOPSIS OF PROGRAM

REGISTRATION

Information Booth, Hotel Belvedere. Daily from 8 A. M. to 10 P. M. February 21st to 26th, 1921.

MONDAY, FEB. 21

Clinics, Lectures and Laboratory Demonstrations in Hospitals and Colleges (see Detailed Program), 8 A. M. to 5 P. M. In evening "Get Together" parties, Smokers and Dinners of State, City, College and Fraternity Groups.

TUESDAY, FEB. 22

(Washington's Birthday)—Clinics, Lectures and Demonstrations in Hospitals and Colleges, 8 A. M. to 5 P. M. Founders Day Exercises—Johns Hopkins University. Special meeting of Officers and Councilors of The American Congress on Internal Medicine and The American College of Physicians, 8 P. M., Hotel Belvedere. Boat trip as guests of Health Department of City of Baltimore in tour of inspection of the harbor.

WEDNESDAY, FEB. 23

Clinics, Lectures and Demonstration in Hospitals and Colleges, 8 A. M. to 5 P. M. In evening complimentary Smoker, Hotel Belvedere, 10:30 P. M.

THURSDAY, FEB. 24

Clinics and Demonstrations in Hospitals and Colleges from 8 A. M. to 2 P. M. In evening banquet of members of The American Congress on Internal Medicine and The American College of Physicians. At 10 P. M. Fifth Annual Convocation of The American College of Physicians. All Members of the Congress as Invited Guests. Hotel Belvedere.

FRIDAY, FEB. 25

Clinics, Lectures and Demonstrations in Hospitals and Colleges, 8 A. M. to 5 P. M. Evening Theatre Party. (If sufficient members interested; leave names at Registration Bureau before noon, Thursday, February 24.)

SATURDAY, FEB. 26

Clinics, Lectures and Demonstrations in Hospitals and Colleges, 8 A. M. to 4 P. M.

PROGRAM OF DAILY CLINICS AND DEMONSTRATIONS

MONDAY, FEBRUARY 21st, 1921

I—General Medicine

1. 9 A. M. University Hospital. Ward G.
 Dr. G. C. Lockard.
 Bedside Clinic.
 (Attendance limited to 6 visitors.)
2. 10 A. M. to 11 A. M. Mercy Hospital.
 Dr. Standish McCleary.
 Clinical Medicine.
 (Attendance limited to 8 visitors.)
3. 10 A. M. to 11 A. M. Johns Hopkins Hospital. Medical Amphitheatre.
 Dr. W. W. Palmer and Associates.
 Lecture.
 (Attendance limited to 200 visitors.)
4. 10 A. M. to 12 M. Bay View Hospital.
 Dr. Thomas R. Boggs.
 Ward Rounds.
 (Attendance limited to 25 visitors.)
5. 10:30 A. M. University Hospital. Amphitheatre.
 Dr. H. D. McCarty.
 Medical Clinic.
 (Attendance limited to 50 visitors.
6. 11 A. M. to 12 M. Mercy Hospital.
 Dr. Harvey G. Beck.
 Clinical Medicine.
 (Attendance limited to 40 visitors.)
7. 11 A. M. to 12 M. Johns Hopkins Hospital. Medical Amphitheatre.
 Dr. F. B. Futcher.
 Clinic.
 (Attendance limited to 200 visitors.)
8. 12 M. to 1 P. M. Johns Hopkins Hospital. Medical Amphitheatre.
 Dr. L. F. Barker.
 Clinic.
 (Attendance limited to 200 visitors.)

II—Laboratory Diagnosis

1. 10 A. M. to 11 A. M. University of Maryland, Medical School, Department of Pharmacology. Second Floor—Old Gray Laboratory.
 Dr. W. H. Schultz.
 Demonstration of some of the more common Intestinal Parasites and their Reaction to certain Disinfectants and Anthelmintics.
 (Attendance limited to 8 visitors.)
2. 2 P. M. to 3 P. M. University of Maryland, Medical School, Department of Pharmacology. Second Floor—Old Gray Laboratory.
 Dr. W. H. Schultz.
 Demonstration of some of the more common Intestinal Parasites and their Reaction to certain Disinfectants and Anthelmintics.
 (Attendance limited to 8 visitors.)

III—Pathology

1. 10 A. M. to 12 M. University of Maryland, School of Medicine, Department of Pathology.
 Dr. S. M. Cone.
 New Formation of Nerves under Pathological Conditions.
 (Attendance limited to 10 visitors.)
2. 10 A. M. to 12 M. University of Maryland, School of Medicine, Department of Pathology.
 Dr. L. C. Spencer.
 His Bundles and Heart-block.
 (Attendance limited to 10 visitors.)

IV—Psychiatry

1. 2 P. M. to 5 P. M. Shepard and Enoch Hospital.
 Dr. Ross McC. Chapman and Staff.
 Psychiatric and Borderline Cases.
 (Attendance limited to 100 visitors.)

V—Tuberculosis

1. 11:30 A. M. University Hospital. Amphitheatre.
 Dr. Chas. C. Habliston.
 Pneumothorax, Artificial and Natural—With X-rays.
 (Attendance limited to 50 visitors.)

TUESDAY, FEBRUARY 22nd, 1921.

I—General Medicine

1. 9 A. M. University Hospital. Ward G.
 Dr. D. C. Streett.
 Bedside Clinic.
 (Attendance limited to 6 visitors.)
2. 10 A. M. to 11 A. M. Mercy Hospital.
 Dr. Erwin Mayer.
 Clinical Medicine.
 (Attendance limited to 8 visitors.)
3. 11 A. M. to 12 M. Mercy Hospital. Room 33.
 Dr. Geo. McLean.
 Some Interesting Chest Conditions.
 (Attendance limited to 50 visitors.)
4. 11 A. M. to 12 M. Mercy Hospital.
 Dr. Wm. F. Lockwood.
 Medicine.
 (Attendance limited to 10 visitors.)

II—Gastro-Intestinal Diseases

1. 8 A. M. to 10 A. M. Widerholtz Sanitarium. Roland Park.
 Dr. Julius Friedenwald.
 Duodenal Intubation with Gall-bladder Drainage.
 (Attendance limited to 25 visitors.)

III—Laboratory Diagnosis

1. 2 P. M. to 3 P. M. School of Hygiene, Johns Hopkins University.
 Dr. C. G. Bull.
 Precipitin Test for the Diagnosis of Gonococcus Infections.
 Lecture and Demonstration.
 (Attendance limited to 50 visitors.)

IV—Neurology

1. 10 A. M. to 12 M. Johns Hopkins Hospital.
 Drs. Taneyhill and Burns.
 Neurological Cases.
 (Attendance limited to 50 visitors.)

V—Borderline Medicine

1. 9 A. M. to 1 P. M. St. Agnes Hospital Clinic.
 Drs. Bloodgood, O'Mara and Staff.
 Medical and Borderline Subjects.
 (Attendance limited to 200 visitors.)

WEDNESDAY, FEBRUARY 23rd, 1921

I—General Medicine

1. 9 A. M. University Hospital. Ward G.
 Dr. J. E. Gichner.
 Bedside Clinic.
 (Attendance limited to 6 visitors.)
2. 10 A. M. to 11 A. M. Johns Hopkins Hospital. Medical Amphitheatre.
 Dr. A. L. Bloomfield.
 Lecture.
 (Attendance limited to 200 visitors.)
3. 12 M. to 1 P. M. University Hospital. Amphitheatre.
 Dr. Edward A. Looper.
 Focal Infections in Upper Respiratory Tract.
 (Attendance limited to 50 visitors.)
4. 10 A. M. to 11 A. M. Mercy Hospital. Room 33.
 Dr. Chas. C. W. Judd.
 Ward Rounds.
 (Attendance limited to 8 visitors.)
5. 11 A. M. University Hospital Amphitheatre.
 Dr. Gordon Wilson.
 Chronic Recurrent Basilar Bronchitis.
 (Attendance limited to 50 visitors.)
6. 11 A. M. to 12 M. Johns Hopkins Hospital. Medical Amphitheatre.
 Dr. L. V. Hamman.
 Clinic.
 (Attendance limited to 200 visitors.)
7. 2 P. M. South Baltimore General Hospital.
 Dr. A. F. Ries.
 Sub-diaphragmatic Abscess.
 (Attendance limited to 24 visitors.)

II—Gastro-Intestinal Diseases

1. 8 A. M. to 10 A. M. Mercy Hospital
 Dr. Julius Friedenwald.
 Treatment of Peptic Ulcer.
 (Attendance limited to 25 visitors.)

2. 2:30 P. M. South Baltimore General Hospital.
 Drs. Harvey Beck and Geo. McLane.
 Gastro-Intestinal Syphilis and Vacuum Apparatus for Removal of Test Meals.
 (Attendance limited to 24 visitors.)

III—Pathology

1. 11 A. M. to 12 M. Chemistry Hall (Lombard and Green Streets).
 Drs. G. C. Lockard and L. C. Spencer.
 Clinico-Pathological Conference.
 (Attendance limited to 50 visitors.)
2. 2 P. M. to 3 P. M. University Hospital.
 Dr. H. J. Maldeis.
 Clinical Pathology and Exhibition of Specimens.
 (Attendance limited to 6-8 visitors.)

IV—Neurology

1. 3 P. M. South Baltimore General Hospital.
 Dr. Emil Novak.
 Progressive Muscular Atrophy Clinic.
 (Attendance limited to 24 visitors.)
2. 4 P. M. South Baltimore General Hospital.
 Dr. C. Urban Smith.
 Spasmodic Torticollis.
 (Attendance limited to 24 visitors.)

V—Borderline Disease Clinic

1. 4:30 P. M. South Baltimore General Hospital.
 Dr. Emil Novak.
 Borderline Cases Clinic.
 (Attendance not limited.)

VI—Actinology

1. 10 A. M. to 12 M. University Hospital.
 Dr. H. J. Walton.
 Roentgenology.
 (Attendance limited to 4-8 visitors.)
2. 3:30 P. M. South Baltimore General Hospital.
 Dr. John Evans.
 X-ray Demonstration.
 (Attendance limited to 24 visitors.)

VII—Laboratory Diagnosis

1. 10 A. M. to 11 A. M. University of Maryland, Medical School Department of Pharmacology. Second Floor—Old Gray Laboratory.
 Dr. W. H. Schultz.
 Demonstration of some of the more common Intestinal Parasites and their Reaction to certain Disinfectants and Anthelmintics.
 (Attendance limited to 8 visitors.)
2. 2 P. M. to 3 P. M. University of Maryland, Medical School, Department of Pharmacology. Second Floor—Old Gray Laboratory.
 Dr. W. H. Schultz.
 Demonstration of some of the more common Intestinal Parasites and their Reaction to certain Disinfectants and Anthelmintics.

THURSDAY, FEBRUARY 24th, 1921.

4. 10 A. M. to 12 M. Bay View Hospital.
 Dr. Thomas R. Boggs.
 Ward Rounds.
 (Attendance limited to 25 visitors.)

I—General Medicine

1. 9 A. M. University Hospital. Ward G.
 Dr. H. D. McCarty.
 Bedside Clinic.
 (Attendance limited to 6 visitors.)
2. 9 A. M. to 10:30 A. M. Johns Hopkins Hospital, Medical Wards.
 Dr. W. S. Thayer.
 Ward Rounds.
 (Attendance limited to 30 visitors.)
3. 10 A. M. to 11 A. M. Mercy Hospital.
 Dr. Geo. McLean.
 Ward Clinic.
 (Attendance limited to 8 visitors.)
5. 11 A. M. to 12 M. Mercy Hospital.
 Dr. Wm. F. Lockwood.
 Medicine—Ward Rounds.
 (Attendance limited to 10 visitors.)

6. 12 M. to 1 P. M. Johns Hopkins Hospital. Medical Amphitheatre.
 Dr. W. S. Thayer.
 Clinic.
 (Attendance limited to 200 visitors.)

II—Experimental Medicine

1. 10 A. M. to 11 A. M. University of Maryland, School of Medicine. Physiological Laboratory.
 Dr. Bartgis McGlone.
 (Attendance limited to 10 visitors.)

III—Actinology

1. 10 A. M. to 12 M. University Hospital.
 Dr. H. J. Walton.
 Roentgenology.
 (Attendance limited to 4-8 visitors.)
2. 10:30 A. M. to 11:30 A. M. Johns Hopkins Hospital. Medical Amphitheatre.
 Dr. W. S. Thayer, Dr. F. N. Baetjer.
 Roentgenology.
 (Attendance limited to 100 visitors.)

IV—Laboratory Diagnosis

1. 10 A. M. to 12 M. School of Hygiene, Johns Hopkins University.
 Dr. C. G. Bull.
 The Laboratory Side of Diphtheria Work.
 (Attendance limited to 50 visitors.)
2. 2 P. M. Johns Hopkins Medical School. New Hunterian Building.
 Dr. Bayne Jones.
 Bacteriological Demonstration.
 (Attendance limited to 15 visitors.)

V—Neurology and Psychiatry

1. 11 A. M. University Hospital. Amphitheatre.
 Dr. Irving J. Spear.
 Neurological Cases.
 (Attendance limited to 50 visitors.)
2. 2 P. M. to 5 P. M. Shepard and Enoch Pratt Hospital.
 Dr. Ross McC. Chapman and Staff.
 Psychiatric and Borderline Cases.
 (Attendance limited to 100 visitors.)

VI—Pathology

1. 2 P. M. to 3 P. M. University Hospital.
 Dr. H. J. Maldeis.
 Clinical Pathology and Exhibition of Specimens.
 (Attendance limited to 6-8 visitors.)

VII—Miscellaneous

1. 12 M. to 1 P. M. University Hospital. Amphitheatre.
 Dr. Harry Friedenwald.
 Diseases of Eye in Relation to Internal Medicine.
 (Attendance limited to 50 visitors.)

VIII—Endocrinology

1. 2:30 P. M. to 5 P. M. Mercy Hospital.
 Drs. A. C. Gills, Louis A. M. Krause, R. G. Hoskins, Harvey G. Beck, Emil Novak.
 Pituitary and Ovarian Syndromes.
 (Attendance limited to 75 visitors.)

IX—Clinico-Pathological Conference

1. 4:30 P. M. to 6 P. M. Johns Hopkins Hospital. Autopsy Room.
 Drs. W. S. Thayer and W. G. MacCallum.
 Clinico-Pathological Conference.
 (Attendance limited to 100 visitors.)

FRIDAY, FEBRUARY 25th, 1921.

I—General Medicine

1. 9 A. M. University Hospital. Ward G.
 Dr. C. C. Habliston.
 Bedside Clinic.
 (Attendance limited to 6 visitors.)
2. 10 A. M. to 11 A. M. Johns Hopkins Hospital. Medical Amphitheatre.
 Dr. A. R. Dochez.

Lecture.
(Attendance limited to 200 visitors.)

3. 10 A. M. to 11 A. M. Mercy Hospital.
Dr. Standish McCleary.
Clinical Medicine.
(Attendance limited to 8 visitors.)

4. 11 A. M. University Hospital.
Dr. Gordon Wilson.
Consultation Clinic for Senior Medical Students.
(Attendance limited to 50 visitors.)

5. 11 A. M. to 12 M. Johns Hopkins Hospital. Medical Amphitheatre.
Dr. C. G. Guthrie.
Clinic.
(Attendance limited to 200 visitors.)

6. 11 A. M. to 12 M. Mercy Hospital.
Dr. Chas. C. W. Judd.
Medical Clinic.
(Attendance limited to 40 visitors.)

7. 12 M. to 1 P. M. Johns Hopkins Hospital. Medical Amphitheatre.
Dr. A. K. Krause.
Lecture.
(Attendance limited to 200 visitors.)

II—Neurology

1. 10 A. M. to 12 M. Johns Hopkins Hospital. Neurological Dispensary.
Dr. H. M. Thomas.
Neurological Cases.
(Attendance limited to 40 visitors.)

III—Actinology

1. 10 A. M. to 12 M. University Hospital.
Dr. H. J. Walton.
Roentgenology.
(Attendance limited to 4-8 visitors.)

2. 12 M. to 1 P. M. University Hospital. Amphitheatre.
Dr. Henry J. Walton.
X-Ray in Relation to Diseases of the Chest.
(Attendance limited to 50 visitors.)

IV—Borderline Medicine and Pathology

1. 2 P. M. to 4 P. M. Johns Hopkins Hospital. Medical Amphitheatre.
Dr. J. C. Bloodgood.
Lecture.
(Attendance limited to 200 visitors.)

V—Psychiatry

1. 2 P. M. to 4 P. M. Johns Hopkins Hospital.
Dr. Adolf Meyer.
Psychiatric Clinic.
(Attendance limited to 100 visitors.)

VI—Laboratory Medicine

1. 2 P. M. to 4 P. M. School of Hygiene, Johns Hopkins University.
Dr. A. T. Shohl.
New Method for Determining the Acidity of Gastric Contents.
(Attendance limited to 25 visitors.)

VII—Pathology

1. 4 P. M. to 5 P. M. Johns Hopkins Hospital. Pathological Laboratory.
Dr. J. C. Bloodgood.
Laboratory Demonstration.
(Attendance limited to 200 visitors.)

SATURDAY, FEBRUARY 26th, 1921.

I—General Medicine

1. 10 A. M. to 11 A. M. Johns Hopkins Hospital. Medical Amphitheatre.
Dr. A. Keidel.
Lecture.
(Attendance limited to 200 visitors.)

2. 10 A. M. to 11 A. M. Mercy Hospital.
Dr. Erwin Mayer.
Clinical Medicine.
(Attendance limited to 8 visitors.)

3. 10 A. M. to 12 M. Bay View Hospital.
Dr. Thomas R. Boggs.
Ward Rounds.
(Attendance limited to 25 visitors.)

4. 11 A. M. to 12 M. Mercy Hospital.
Dr. Wm. F. Lockwood.
Medicine—Ward Rounds.
(Attendance limited to 10 visitors.)

5. 12 M. to 1 P. M. University Hospital. Amphitheatre.
Visiting Staff.

Exhibition of Cases.
(Attendance limited to 50 visitors.)

6. 11 A. M. to 12 M. Johns Hopkins Hospital. Medical Amphitheatre.
Dr. P. C. Clough.
Clinic.
(Attendance limited to 200 visitors.)

II—Laboratory Diagnosis

1. 10 A. M. to 11 A. M. University of Maryland, Medical School, Department of Pharmacology. Second Floor—Old Gray Laboratory.
Dr. W. H. Schultz.
Demonstration of some of the more common Intestinal Parasites and their Reaction to certain Disinfectants and Anthelmintics.
(Attendance limited to 8 visitors.)

2. 2 P. M. to 3 P. M. University of Maryland, Medical School, Department of Pharmacology. Second Floor—Old Gray Laboratory.
Dr. W. H. Schultz.
Demonstration of some of the more common Intestinal Parasites and their Reaction to certain Disinfectants and Anthelmintics.
(Attendance limited to 8 visitors.)

III—Actinology

1. 10 A. M. to 12 M. University Hospital.
Dr. H. J. Walton.
Roentgenology.
(Attendance limited to 4-8 visitors.)

IV—Pediatrics

1. 11 A. M. University Hospital. Amphitheatre.
Dr. Charles L. Summers.
Pediatric Clinic.
(Attendance limited to 50 visitors.)

2. 11 A. M. to 12 M. Mercy Hospital.
Dr. E. B. Friedenwald.
Pediatrics.
(Attendance limited to 50 visitors.)

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ABSTRACTS
OF CURRENT LITERATURE

THERAPEUTICS

EDITORIAL: A Vaccinotherapia na Influenza. *Brazil-Medico,* February 14, 1920, xxxiv, No. 7, p. 102.

For three years experiments have been made with sera and vaccines in influenza cases. Dr. Lochelonge reports the results obtained by the vaccines from the Pasteur Institute, first formula containing:

Pfeiffer's bacilli 2 billions
Pneumococci 4 billions
Streptococci 2 billions

He obtained excellent results in grave cases of influenza in Epinal. The mortality from the disease was greatly reduced.

On the basis of these results, and of those obtained by other investigations, Dr. Lochelonge formulated the following conclusions:

(1) Only grave cases with unfavorable progress were treated.

(2) All properly treated cases were completely cured.

(3) In the few unsuccessful cases, the failure was attributed to incomplete treatment.

Pasteur Institute prescribes treatment lasting four days. On the first day, ¼ c. c. (4 minims) is given, on the second day, ½ c. c. (8 minims), on the third day, 1 c. c. (16 minims), on the fourth day, 1½ c. c. (24 minims), in two injections. Some of the Epinal physicians failed to give the requisite number of injections—a grave mistake, presupposing the existence of a negative phase. Others gave one or two injections of antistreptococcic serum, according to whether the temperature rose or fell. Later it was found best to modify the vaccine in accordance with the gravity of the condition. Serum containing

Streptococci 5 billions
Pfeiffer's bacilli 5 billions

injected at the subsidence of the fever, gave good results.

Excellent results were also obtained in the cases of an infant of ten months suffering from bronchopneumonia, a man of sixty-eight with influenza pneumonia, and a woman of eighty-two, who had two successive foci of bronchopneumonia, appearing at an interval of three days. These foci disappeared under the influence of treatment (6 injections in each case.)

It was observed that in the case of old persons the therapeutic action of the vaccine diminished the duration of fever, lowering the temperature, but never before the sixth injection. In nearly every case of an adult, the fever was markedly reduced and the temperature fell after the fourth injection, occasionally after the third.

The mortality in pneumonia cases is diminished by vaccine therapy.

Dr. Lochelonge has observed a diminution in the number of bacteria in the serum examined after vaccine therapy.

It is to be recommended that vaccine and clear instructions for its use be widely distributed for the purpose of preventing epidemics such as that of 1918.

EDITORIAL: The Indications for Therapeutic Pneumothorax. *New York Medical Journal,* May 22, 1920, cxi, No. 21, p. 907.

Surgical pneumothorax should not be performed in benign abortion tuberculosis, in slow saprophytic forms, nor in the fibrous type. The diffuse types with bronchial distribution, accompanied by extensive inflammatory epiphenomena, will rarely benefit by it. Artificial pneumothorax is indicated in the extensive localized ulcerative forms and in congestive caseous types, in young subjects, having a destructive evolution and frequently hemophysis. Next are the fibrocaseous forms, usually unilateral, where it is necessary to weigh the risks inherent and the interference with those of the spontaneous evolution of the process.

GRAVES, R. J.: Clinical Lectures on the Practice of Medicine. Hiccup in Typhoid. London, 1884, i, pp. 155-156.

When hiccup occurs in typhus fever it is generally owing to a congested state of the mucous membrane accompanied by flatulent distention of stomach and bowels. In such cases the remedies adapted for tympanites in typhus fever are most appropriate. When hiccup occurs early in the disease along with much thirst, parched tongue, and tender epigastrium, treatment ought to consist of leeches to that part, iced water in small quantities, diete absolue, and bland aperient injections. When it comes on late in the disease, stimulating liniments must be applied to the spine, blisters to the epigasrium, if bowels are confined and distended, while strength is supported by wine or proper nutriment.

Hiccup occasionally occurs without any obvious derangement of the alimentary canal and no detectable cause of this symptom. Here the treatment must be empirical, and relief will frequently be obtained by exhibition of some substance which has an obvious action on the nervous system.

DAVIDSON, M.: The Antidiuretic Effect of Pituitary Extract in Diabetes Insipidus. *Lancet,* August 21, 1920, p. 401.

The patient, a man aged thirty-four years, complained of continual polyuria. It was decided to adminster hypodermic injections of pituitary extract. The antidiuretic effect of the pituitrin was such as to cause an appreciable diminution in the total excretion of urine and the effect was much more pronounced during the period shortly following the injections.

SYMES, J. O.: Some Points in the Prognosis and Treatment of Chronic Nephritis. *British Medical Journal,* April 10, 1920, pp. 494-496.

In cases of chronic parenchymatous nephritis, the reduction of edema by the adoption of a salt-free diet has not been very successful. The reduction of the edema by the use of diuretics is equally disappointing.

Successful cure of chronic parenchymatous nephritis is much more likely to follow the procedure suggested by Epstein. He pointed out that the steady loss of large quantities of albumin in this variety of nephritis caused a decrease in the osmotic pressure of the blood, which first favors the absorption and retention of fluid by the tissues, hence the great edema. The blood in such cases shows a marked decrease in protein and an increase in fatty bodies.

The indications for treatment, therefore, are first to increase the protein content of the blood and thus restore its osmotic power, and, secondly, to remove the excessive lipoids. To effect these ends, he administers a diet rich in protein and poor in fat; for instance, fish, lean meat, lean ham, white of egg, oysters, lentils, peas, rice, oatmeal, bananas, skimmed milk, coffee, tea and cocoa; fluids from 1,200 to 1,500 c. c. (1½ to 2 pints); salt to taste. Starchy foods are limited in order to promote the maximum assimilation of proteins and to lessen the retention of water. Fat is limited to lessen the amount of lipoids.

The author has found this diet to be most efficacious in reducing nephritic edema, and, further than this, it has resulted in a very marked improvement in the patient's general condition and in reducing the amount of albumin in the urine.

HUBENY, M. J.: *X*-ray Treatment of Exophthalmic Goiter. *Illinois Medical Journal,* June, 1920, xxxvii, 383.

Hubeny points out that the treatment of exophthalmic goiter and other forms of thyrotoxicosis by the roentgen ray is of definite value when its selection is properly made and its application properly performed.

He also emphasizes the importance of careful diagnosis and the selection of patients to be treated. The physicians best able to treat goiter must have sufficient judgment to enable them to select the treatment, medical, surgical or roentgenological, best adapted for each individual case.

Adolescent goiter associated with toxic symptoms is amenable to roentgenotherapy with no untoward results. Medical and surgical treatment are sometimes considered with reluctance because of the dangerous possibilities and also because they tend to get well spontaneously.

However, it is impossible to prognosticate the ultimate results in after years, for C. H. Mayo (cited by the author) has stated, "that such glands are subject to degeneration,—fibrous, cystic or calcareous."

Baggs (cited by the author) treated such cases twelve years ago and states that up to the present time none of these have shown evidences of degeneration.

TREATMENT.—Hubeny has practiced two technics:

Technic 1.—Interrupterless machine, broad focus Coolidge tube. Parallel spark gap nine inches. The rays filtered through four mm. (.15748 inches) of aluminum and 1 mm. (.03937 inches) of leather. The skin focus distance was 8 inches. Three areas were treated at each sitting, each area receiving two-thirds of an erythema dose. Areas treated: (1) right half of goiter; (2) left half of goiter; (3) thymic region. This constitutes one treatment. Repeat in three weeks.

Give such treatments, then stop for three months; this is considered one series. Then give a second series. If necessary a third series may be given for three months.

Technic 2.—Interrupterless machine. Broad focus Coolidge tube; 9 inch parallel spark gap, 4 mm. (.15748 inches) of aluminum filtration. 1 mm. (.03937 inches) of leather filtration. Skin focus distance 14 inches. Sittings 3 to 6. Six areas: (1) right anterior thyroid; (2) left anterior thyroid; (3) right anterior thymus; (4) left anterior thymus; (5) right posterior cervical ganglion area; (6) left posterior cervical ganglion area. Dose, one-half erythema over each area. The same frequency of repetition as Technic 1 applies. The technic as given in 2, is one of choice when the patient is not highly toxic, allowing a gradual recrudescence of symptoms with less tendency towards recurrence. In this technic the areas over the cervical ganglia are included; this is based on the observations of Cannon that stimulation of these centers causes secretory activity in the thyroid, and that the effect of the *x*-ray seems to inhibit their action.

Supporting Cannon's claims are the operative results of Schwartz who practised bilateral resection of the sympathetic nerves with some good results.

If, for any reason such as cardiac weakness or marked thyrotoxicosis, immediate results are desired, Technic 1 is to be employed.

If operative interference becomes necessary it is desirable to give an intensive course several weeks prior to the time of operation.

Some claims have been made that changes in the capsule interfere with the removal of the gland; this however, has been refuted by the experience of Ludin, Holmes and others.

The earlier the cases receive treatment the sooner their response to roentgenotherapy.

The favorable signs are the abatement of the nervous symptoms, gain in weight, slowing and stabilizing of the pulse, with a lessening or disappearance of exophthalmos in about 40 per cent of the cases. The goiter may or may not become smaller.

In ambulatory cases no interference with the daily occupation is necessary; in marked thyrotoxicosis regulation of rest, both physical and mental is of utmost importance.

All foci of infection should be removed, especial attention being paid to the teeth.

Some of the undesirable and dangerous possibilities are hypothyroidism, telangiectasis and atrophy of the regions subjected to the rays. These patients are particularly susceptible to atrophy and telangiectasis, and as the majority are young women, the resulting disfigurement (when it does occur) is of considerable import. These changes are more liable to occur when unfiltered rays are employed or repeated erythema produced.

The first treatment may increase the toxemia to a dangerous degree. To obviate this, the author advises small doses preceded with rest in bed. Where surgery has been employed but no complete cure effected, great caution is indicated as the danger of hypothyroidism is then much greater.

Treatment should not follow operation too soon and should not be prolonged.

Davis, J. S.: The Radical Treatment of *X*-Ray Burns. *Annals of Surgery,* 1920, lxxii, 224.

The author's experience covers instances of burns on almost every part of the body. They are divided into three classes: first degree, skin reddened; second degree, blisters formed; third degree, full thickness of skin and underlying tissues involved. The majority of cases considered are in the last class.

An *x*-ray burn may have existed sometime before the extent of the damage is apparent. The ulcers may be superficial or may involve, as in one instance, even the entire thickness of the abdominal wall. The history of them is that they heal slowly and then break down, the process being repeated over and over again. An irregular patch of tightly adherent necrotic tissue usually occupies the centre of the ulcer. The edges are thickened and grayish-red, very hard, often everted. The clinical appearance suggests malignancy. The surrounding normal skin is often infiltrated with scar. Deep burns are characterized by sensitiveness, due to infection which is always present, to nerve changes, or to pressure on nerves by scar tissue. Intense pain frequently followed spontaneous healing owing to nerve changes. The author considers the tendency to malignant degeneration in these burns no more marked than in any other ulcer.

Dr. J. C. Bloodgood reports on the excised tissues as compared with any other type of simple ulcer: "*X*-ray keratosis at the edge of the ulcer with atypical down-growth of epithelium, with or without pearly body formation; a very superficial zone of cellular granulation tissue, unusual scar tissue formation, which as a rule, extends to the muscles; thickening of the walls of the blood-vessels with endothelial obliteration, and minute abscess formation beneath the surface of the ulcer."

A tendency toward malignant degeneration is seen when chronic ulceration follows the breaking down of a patch of keratosis, as on the hands of the pioneer roentgenologist. Two cases are mentioned in which the axillary glands were involved and removed. In one case there has been no recurrence after a number of years; in the other insufficient time has elapsed to predict accurate results.

Treatment.—Palliative measures should first be tried, as with ordinary burns. Where prompt response is not secured, particularly with burns of the third degree, the ulcer and surrounding tissue should be excised with a wide margin down to healthy tissue and the wound should be grafted just as soon as possible.

Regaud, C.: Rational Foundation, Technical Indications and General Results of Radiotherapy of Cancer (Fondements rationnels, indications techniques et resultats generaux de la radiotherapie des cancers). *Journal de Radiologie et d'Electrologie,* 1920, iv, No. 10, pp. 433-455.

Curietherapy.—Radium, radium emanations, and mesothonium are used, with very little difference in the biologic action of the three, except that the gamma rays from mesothonium are somewhat more penetrating than the gamma rays from radium or radium emanation. Of the rays given out by radioactive bodies alpha, beta, gamma—only the latter two are used in cancer. The gamma rays are used alone, the beta rays being totally excluded, when the radioactive apparatus is used with a filter equivalent to 0.6 mm. of platinum in thickness. This filtration "selects" the gamma rays, and shuts out the less penetrating ones. When the primary filtration is less strong, as in radium-puncture, a certain proportion of the less penetrating gamma rays, and some of the beta rays, are admitted. When cancer is treated by Janeway's method of plain glass tubes of emanation, both beta and gamma rays are used in their entirety.

The total radio-active energy, including the alpha rays, is used in interstitial injections ("dépôt actio") of radium emanation. Use is also made of radium puncture of the method of simple glass tubes ("tubes nus") which utilize the caustic beta rays when they are inserted into neoplastic tissue which is to be resorbed. But in general, radium therapy tends to utilize vibratory radiation, of increasing penetration, selected by a filter of varying thicknesses.

The hard gamma rays (with the softer rays filtered out) act strongly upon certain cells which are particularly sensitive to them, and not at all upon others. Burning of the skin in treatment of subcutaneous lesions, indicates that the rays used have too little penetration, *i. e.,* are too absorbable.

The radio-sensibility of the cells depends upon certain physiological states, often temporary, especially upon the process of cell division, during which the sensitivity is particularly great. Another moment of great sensibility corresponds to the maximum of metabolic activity of the nucleus, in cells which exercise a secretory function. As cellular division and nucleus metabolism are temporary states, one finds alternating phases of radio-sensitivity and radio-resistance in the life of the same cell or group of cells. The action of the *x*-ray or gamma rays upon a sensitive cell results in its death. In less sensitive cells the reproductive functions are paralyzed or destroyed. If it continues to divide, the daughter cells show deformation and degenerescence, and eventually die.

The dead cells disappear by autolysis or phagocytosis. The intercellular tissue is resistant, and is resorbed slowly.

Thus, the short and gamma rays are the elective poisons of the nuclear chromatin which is at the basis of heredity, and therefore prevent or hinder cell reproduction. Herein lies the value of radiotherapy for cancer.

The forms of neoplasm differ among themselves in degree of radio-sensitivity, but in general they are more sensitive than is normal tissue. The physician must regulate his dose carefully to each case, in order to find the amount which will destroy the neoplastic tissue and yet not injure the surrounding normal tissues.

As at a given moment the cells in one neoplasm are not equally radio-sensitive, a single dose may kill some, paralyze others, and merely excite the more resistant ones.

In a closed and not infected tumor (not ulcerated) the liquidation of the cells which have been killed by the radiations (*x*-rays or much filtrated gamma rays) takes place by autolysis and resorption, without massive necrosis or inflammatory reaction. In an open tumor, the pre-established infection complicates the liquidation, and necrosis often results. The intercellular tissue disappears only after the neoplastic cells have been resorbed, if at all. A completely sterilized closed fibrosarcoma sometimes leaves

behind it a more or less voluminous fibrous residue. This applies only to the rays and gamma rays of high penetration. In the case of soft rays, whether corpuscular (alpha and beta) or vibratory (gamma) the cytocaustic electivity plays no part. Around an interior focus produced by a radioactive needle of feeble filtration, or by naked tubes of emanation, a diffuse cylinder of disintegration is produced, in which the normal cells are no more immune than the neoplastic cells. This is the case with skin burned by *x*-rays.

In order of decreasing radiosensitivity the neoplasms range thus: lymphosarcomata, globocelluar sarcomata with small or large cells, polymorphocellular sarcomata, sarcomata with myeloplaces, myxosarcomata, fusocellular sarcomata, fibrosarcomata, chondrosarcomata, osteoid sarcomata. It is striking that the most sensitive of these varieties are those less rich in conjunctive fibers or in collagenous substance.

The choice between radiotherapy and operation must be partly determined by the position of the neoplasm cancers of the pharynx, esophagus, floor of the bladder, prostate, etc.; they are practically inoperable, but yield to radiotherapy, whereas cancers of the digestive tube between the esophagus and the rectum cannot be favorably reached by radioactive influences.

Epidermoid cancers are especially radioresistant, and must be excised.

Cancer of the neck of the uterus in which there is no extension beyond the uterus, should be treated first by radium, and a few weeks later by surgery, to prevent any danger of recurrence.

Cancer of the breast may be advantageously treated by radium puncture. Even if this does not entirely destroy the foci, so that a subsequent operation is necessary the danger of recurrence and of spreading of the neoplastic germs during operation is diminished, and skin creatinzation is lessened.

It is probable that the formation of metastases elsewhere in the body is slightly more rapid after radium therapy than after surgical intervention, perhaps because the substances resulting from the destruction of the cells by the rays, and which are resorbed favor the development of hitherto latent localizations.

The contra-indications to radiotherapy in inoperable cancer are: (*a*) general poor state of patient, (*b*) acute forms of cancer, (*c*) refractory types of neoplasms (such as epidermoid branchiomes, melanic sarcomata, etc.), (*d*) grave superimposed infection (danger in such cases may be lessened by disinfecting puncture and drainage or autovaccination preceding radium treatment), (*e*) special cases of pelvic infections complicating uterine cancer, (*f*) risk of perforating a cancerous cavitary organ, thus causing secondary infection (peritonitis, etc.), (*g*) osseous necrosis (maxillary), and (*h*) symptoms of visceral metastasis.

In inoperable and incurable cases, radiotherapy may bring about considerable amelioration and relief, mainly by cicatrization of the ulcerous lesions, thus covering the denuded surfaces, and reducing the size of the tumors. One important result is the relief of pain; the radiation may reduce the compressions of the nerve trunks, or soften and render more elastic the tissues involved in the cancer.

The author finds little value in postoperative radium-therapy. He considers the operation merely as a possible auxiliary to radio-therapy, except in the cases in which radiation is impossible. In a few cases partial operation is necessary in order to prepare the way for the radiation.

Technic.—In curietherapy, the method consists in interstitial injection throughout the neoplasm of a radio-active body of short life and intense radio-activity (active focus of radium emanation).Radio-puncture consists in small tubes of radium or mesothorium, either by metallic needles containing radium emanation (Stevenson), or by naked tubes of the emanation left in the tumor (Janeway).

When the radio-active body is applied externally over healthy tissue, one should use a primary filtration (equivalent to 1 mm. platinum) and a strong secondary filtration,

in order to avoid severe burns when a sufficient dose is administered. This applies to transcutaneous, intrabuccal, intravaginal, intra-uterine and intra-rectal radiation.

With radium puncture, the filtration may be diminished, or even dispensed with. When platinum needles of 0.3 mm. bore are used the more absorbable beta and gamma rays are arrested, and the zone of disintegration is small. When one uses naked tubes of emanation most of the beta and gamma rays are used, and the zone of disintegration is larger. The location and size of the lesion, and its relation to the healthy surrounding tissue must determine the method to be used. In general, if one requires an equal irradiation of a large superficial surface, roentgenotherapy is preferable; for intense radiation of a limited focus, especially when the neoplasm is deep, curietherapy is to be used. In most cases a judicious combination of both methods is advantageous. If the skin and mucous membranes are to be protected, as in case of repeated irradiation, radium puncture is to be preferred.

The dosage in each case should be the highest amount compatible with the integrity or rapid reparation of the normal tissues.

Nogier, M. T.: Results Obtained from Radium Treatment of a Cancer of the Neck of the Uterus (Resultats eloignes du Traitement per le Radium d'un Cancer du col Uterin). *Journal de Radiologie et d'Electrologie,* 1920, iv, No. 7, p. 305.

A neoplasm of the neck of the uterus was operated in May, 1915. Relapse ensued, and a new operation in September, 1915, was also followed by relapse.

Radium was applied in October, 1915; 125 mg. (1.925 grains) Ra Br_2 $2H_2O$ for fifty-three hours.

Cure resulted. The patient gained 9 kg. (19½ lbs.) in weight. Cure persisted, as demonstrated by examinations in 1916, 1917, 1918, 1919, 1920.

Procedure.—The neck of the uterus was blocked by hard growths which bled when the attempt was made to insert the index finger. As the opening was not large enough to permit the proper application of radium, a series of progressive dilatations of the neck were performed on Oct. 2, 3, and 4, without anesthesia, by means of hysterometers, numbers 6, 7, and 8 of the Hegar scale.

On Oct. 5th, the 125 mg. of radium were applied filtered through 0.5 mm. platinum (no supplementary filter).

Technic.—The tubes of radium were fixed side by side on a cotton holder, after having been covered by a red rubber sheath 2 mm. thick. The cotton holder was inserted into the neck of the uterus, so that the lower extremities of the tubes of radium were on a level with the growths. The tubes were 30 mm. high; the zone of maximum irradiation therefore included the neck and the lower part of the uterus.

Dosc.—There was a temporary slightly painful swelling of the genital organs, and occasional absence or scantiness of the menses, also slight constipation. Otherwise the general health of the patient was good. She gained in weight, her appetite was good, and there was no pain.

Examinations showed retraction of the uterus and no recurrence of the growths. There has been no relapse.

Levin, I.: The Rationale of Radium Therapy in Cancer. *American Journal of Roentgenology,* Nov., 1920, vii, No. 11, p. 552.

It is known that the biological effect of *x*-ray sand radium rays on plant and vertebrate animal organisms differ within the various tissues. The cells most sensitive to the action of the rays are the leukocytes, and these cells present the most favorable material for the study of the "selective" action of the rays.

In a case of lymphatic leukemia, with an enlarged spleen, two applications of radium within a week, 2016 millicurie hours in all, reduced the leukocyte count from 226,000 to 12,000, and the spleen was reduced to half its size.

The "selection" biological action of radium goes beyond the apparent structural differences of the cells. The lymphocytes of lymphatic leukemia and those of inflammatory leukocytosis are morphologically identical. Nevertheless, radium destroys the former and has only a slight effect upon the latter.

Radium and *x*-rays rapidly reduce the number of myelocytes in the blood in cases of myelogenous leukemia, but not in cases of skeletal metastases in carcinoma, although the two types of myelocytes are morphologically identical. This is due to the biological difference between the two types. The young myelocytes of myelogenous leukemia are rapidly proliferating and are therefore highly sensitive to the rays, whereas the more mature myelocytes of skeletal metastases are more resistant. "Thus, 'selective action' means that the identical rays act differently upon different tissues."

On the other hand, rays of a different quality affect the same type of tissue differently. The soft *x*-rays and alpha rays of radium act differently on the skin from the hard *x*-rays and gamma rays of radium. Thus, the same tissue may destroy or "absorb" one type of rays and not influence another "selective absorption".

The harder rays have a more selective action on the tissues than the softer rays. Therefore, the action of radium differs qualitatively from that of *x*-rays, "and must be more beneficial for therapy."

The great practical value of the "selective action" of the rays consists in the fact that large quantities necessary for the treatment of malignant tumors may be employed without injuring the adjacent normal tissues.

Mechanism of the Action of Radium on Cancer.—The specific selective action of radium on the tumor, consists in arresting its development.

Experiments with plants inoculated with crown gall showed that untreated control plants developed large galls, while rayed plants did not develop any growth.

The cancer cells normally develop and degenerate. But in malignant tumor the cancer cells are quickly rejuvenated before they reach senility, due to their division, into young daughter cells. When the rays arrest this proliferation the cancer cells mature and degenerate and ultimately die. The importance of the connective tissue which forms around radiated cancer cells consists in the fact that it walls in and holds in check any stunted but viable cancer cells which may have survived the radiation.

The formation of connective tissue appears to be a protective reaction on the part of the organism itself, and is not directly due to the rays. The proliferating malignant cancer cells interfere with this formation of connective tissue. The rays inhibit the proliferation and thus weaken the cancer cells, and the organism is enabled to form a protective connective tissue barrier around the tumor.

Correspondingly, in bone tumors, "radium therapy may enhance the healing power of the organism, destroy at least a major part of the malignant tumor, and surround it with newly formed bone."

The Advantages of the Use of Buried Emanation Tubes.—The data furnished indicate that radium exerts a truly specific selective action on cancer tissue. Biologically, then, radium therapy in cancer has a thoroughly scientific foundation and presents the nearest approach to a scientific therapeutic measure against the disease. In practice, however, the action of radium has its limitations, and the results obtained thus far vary in accordance with the size and location of the tumor. The effectiveness of the rays diminishes in inverse ratio to the increase of the distance and the size of the tumor. A preliminary surgical removal of the main mass of the tumor, even when radical surgery is impossible, diminishes the difficulties in connection with the size of the tumor. The placing of the radium in near approximation to or within the tumor does away with the disadvantages which are presented by a greater distance between the source of radiation and the tumor.

A new method was recently developed by Duane of Boston which obviates to a great

extent the difficulties created both by the size and location of the tumor. It consists in the use of buried radium emanation tubes. Each minute glass tube contains not more than about 3 millicuries. A sufficient number of the tubes is buried in the tumor to cover its whole mass and is left there permanently. The emanation decays after a time and the tubes become inert.

While this method is simpler and frequently more efficient than the external application of radium, one must not lose sight of the fact that the action of the buried emanation is not as strictly selective as the external application of well-filtered rays. The emanation in the minute tubes is filtered only by the glass walls of the latter. Therefore the soft beta rays also act on the tumor and may produce small foci of necrosis around the buried tubes. Care must be taken, therefore, not to place the tubes too near the surface of the tumor nor too near large blood-vessels or nerves. Neither must the emanation tubes be placed too near each other. But with correct technic this method will in the near future supersede the external application of radium in combination with incomplete surgery and become the method of choice in many conditions. The method of buried emanations should always be accompanied, however, by external application in the areas of the regional lymph-glands and the areas directly adjoining the tumor.

Correct Function of Radium and X-rays in Cancer Therapy.—Some physicians have attempted a radical cure of cancer by applying one intense dose of radium or *x*-rays, which is not repeated for a long time, if at all. The author condemns this method for the reason that the rays inhibit the proliferation of the cancer cells, which may, however, be merely "stunned" and remain alive. Some of them may later recover their proliferative power and create a new tumor mass if not radiated repeatedly.

"No matter how intensive the radiation, it is just as incapable of destroying in every patient all the cancer cells of the treated region as radical surgery is of curing 100 per cent of the operated cases. Therefore the correct technic consists in repeated applications of a correct dose at stated intervals. The insertion of buried emanation tubes should usually be done only once in the same region; but it must be followed by repeated external applications in the surrounding areas.

The only method of preventing recurrences and especially the formation of metastases in other regions of the organism is to "ray prophylactically the regions in which the formation of recurrent or metastatic tumors is probable and this is in the estimation of the writer the true function of *x*-ray therapy in cancer.

For the destruction of a discrete circumscribed cancer nodule of a fair size, the action of radium applied by the aid of modern technic and in the large quantities which most of the operators control to-day, is by far superior to the *x*-rays. On the other hand the *x*-rays should be used when a great deal of ground has to be covered, but where all the nodules are minute or even microscopical.

Adler, L.: Radium Treatment of Malignant Tumors (Die Radiumbehandlung maligner Tumoren). Abst. in *Fortschritte auf dem Gebeite der Roentgenstrahlen,* July 8, 1920, xxvii, No. 3, p. 332.

"The monograph reports experiments, successful or otherwise, with radium therapy, at the University Clinic for Women at Vienna, and 250 case reports. The degree of the radiation is calculated in terms of the amount of the radium mass used, and the duration of the exposure."

"Various radium containers were used, with a constant degree of filtration, on the skin of the same individual, and the maximum dose for the healthy skin calculated, as well as the length of exposure which caused erythema and burns."

"The dose used in the treatment of carcinoma must destroy the carcinoma surely and completely, without causing serious injury to the surrounding tissue. In deep

radiation one must consider distance exposure, prolonged exposure, and intermittent treatment (choice of filters). The injury curve for carcinoma rises more quickly than does that for normal tissue. Destruction of the carcinoma by a single exposure is impossible. In intermittent radiation the bladder is most endangered (emptying). In raising the dose it is important that the degree of radiation should not exceed the lethal dose for the carcinoma. According to the individual case, central application, peripheral application, or cross-exposure should be employed. The radium treatment affects bleeding, itching, pain, general health, etc.. The possible injuries are: burning of the healthy surrounding tissue, disturbance of function of contiguous organs, subsequent necrosis."

The author also discussed the clinical results of radium treatment of carcinoma, the prophylactic after-treatment with radium in operated cases, and the radium treatment of non-malignant disease. He "does not approve of non-operative treatment of operable carcinomata because of the primary mortality of radium treatment, the danger of formation of metastases during treatment, the difficulty of carrying through of the radiation, consistently and uniformly, and of determining the indications for discontinuing treatment. The results of prolonged radiation were unfavorable. Of 5 inoperable cases of sarcoma and carcinoma treated by intermittent radiation, 2 were cured; of 9 inoperable cases of carcinoma vulvæ, 5 were cured; of 4 inoperable cases of carcinoma of the vagina, 2 were cured; of 3 inoperable cases of corpus-carcinoma, 2 were cured; of 137 inoperable cases of carcinoma colli, 28 were cured."

The book contains detailed case histories.

Skully, F. J.: Intravenous Foreign Protein in the Treatment of Psoriasis. *Journal American Medical Association,* 1917, lxix, 1684-1686.

Following the report of Engman and McGarry (*Journal American Medical Association,* 1916, p. 1741) on intravenous injection of typhoid vaccines in psoriasis, the Cook County Hospital, Chicago, investigated the treatment in the dermatological wards.

In eight cases chronic psoriasis, typhoid vaccine was prepared from active culture. Each cubic centimeter contained 100,000,000. From 3 to 5 injections were made at intervals of three to four days. The average dose was from 75,000,000 to 100,000,000. Following third injection, 2 per cent chrysarobin ointment was applied daily to lesions on body, and 5 per cent ammoniated mercury ointment on face and scalp. No internal medication.

The reaction following the vaccine was similar to that observed in acute articular rheumatism except that rise of temperature and leukocytosis were not so marked. Maximum temperature 103° F. (39.44° C.)—maximum leukocytosis 17,600. Succeeding injections showed by less marked reaction.

Following first one or two injections, lesions became less inflammatory and indurated; there was no noticeable retrogression in extent of lesions. No new one appeared and scaling diminished. In patients (3) who had previously been using chrysarobin the lesions cleared rapidly after injections of vaccine. In the other patients the condition showed little change until after the application of chrysarobin following which they disappeared in from 8 to 16 days completely.

Dermatitis resulting from prolonged use of chrysarobin cleared up promptly after one injection.

The combination of injection of vaccine and use of chrysarobin had in general favorable results, or was used only in chronic and obstinate cases. The use of neither vaccine alone nor chrysarobin alone was not sufficient to clear up the cases.

The treatment is simply symptomatic, clearing up existing lesions but offering no permanent relief.

The action of the vaccine is not fully understood, but it seems to lessen the sensitiveness of the skin to local medication, allowing uninterrupted treatment.

Mioni: Treatment of Tumors by X-ray and Radium. *Proceedings 5th Congress Internationale de Chirurgie,* July 23, 1920; reported in *La Press médicale,* Aug. 4, 1920, No. 54, pp. 536-7.

There are three classes of tumors which may be treated by radiotherapy:

(1) Superficial tumors, which may or may not be ulcerated, but with which there is no marked adenopathy.

(2) Superficial tumors, with adenopathy, but without apparent metastases.

(3) Malignant tumors of the deep structures.

Superficial tumors are often improved after *x*-ray treatment, when excision is contradindicated because of the extent of the lesion, its multiplicity, or its situation. In 10,000 cases treated in this manner, Scaduto obtained remarkable results,—in certain series of cases, the cures being 100 per cent. His technic consists of producing an abrasion of the tumor surgically, followed immediately by radiotherapy.

In epitheliomas of the buccal and lingual mucosa, Mioni has obtained poor results from this treatment. Of 20 cases which he observed, all but one were only temporarily improved.

Inoperable cancer of the breast, or recurrent cancer of the breast, may be treated by radiotherapy, but the results are poor. The pain disappears, however, and the further development of the tumor may be arrested by this treatment.

Sarcomas and lymphosarcomas are very sensitive to *x*-rays. Minoni has treated 9 cases: two fibrosarcomas of the groin, one sarcoma of the thoracic wall, one osteosarcoma of the clavicle, one melanosarcoma of the neck, two sarcomas of the thigh, one abdominal metastasis of an axillary sarcoma, and one lymphosarcoma of the mediastinum. The improvement in most of these cases has, however, been of short duration.

Radiotherapy of deep cancer may be employed, especially in gynecologic practice, and also in acromegaly (radiotherapy of the hypophysis).

All radiotherapy has local effects only. Excision of the neoplasm, which is also local, is a much more serious procedure, but surgical treatment of tumors cannot be discarded, because of the uncertainty of the effects of radiotherapy.

X-ray treatment is a good adjuvant to surgery, and can render tumors, considered inoperable, operable. Radiotherapy should always be preceded by an excision as complete as possible, in order that the rays may have a more powerful effect.

Cottenot: Roentgen Treatment of Localized Tuberculosis. *Journal de Radiologie et d' Electrologie,* Nov., 1919, iii, No. 10; abstracted *Journal American Medical Association,* 1920, lxxiv, 768.

Cottenot has compiled a long list of local tuberculous lesions benefitted by roentgen treatment. It is still a question whether tubercle bacilli are destroyed by the rays, but there is general agreement that the cells of the tubercles are destroyed by them, while proliferation of connective tissue is promoted. Five results have been obtained during the past ten years. Best results are with the tuberculous processes of the small bones, as they are most accessible to the rays. He has cured many cases of processes in the long bones and joints by combining roentgen irradiation with immobolization after evacuating pus and sequesters.

Iselin has reported more than 800 cases of cured tuberculous osteo-arthritis.

Taylor, H. D.: The Effect of Exposure to the Sun on the Circulating Lymphocytes in Man. *Journal Experimental Medicine,* Jan., 1919, No. 1, pp. 41-2.

"Massive *x*-ray exposures decrease, while small ones increase the number of lymphocytes in the circulating blood. It seems possible that the beneficial results of heliotherapy in surgical tuberculosis noted by Rollier and others might be due in part at

least to a similar effect of the actinic rays of the lymphoid organs, leading to an increase in the number of circulating lymphocytes. The fact that heliotherapy is applied chiefly in high altitudes in the Alps suggested that the actinic rather than the heat rays were the therapeutic agents. The ultraviolet rays contained in light of solar origin lie in that portion of the invisible spectrum included between four thousand and two thousand nine hundred and fifty Augström units. Light waves of lengths included between two thousand one hundred and two thousand eight hundred, and even those up to four thousand Angström units are bactericidal."

But, as these surgical lesions are deep-seated and ultraviolet rays have but a feeble penetrating power, it is scarcely probable that their direct destructive power upon the bacterial causes is responsible for clinical improvement.

On the basis of experiments (described page 42-51) on the relation between the increase in the lymphocytes and sunburn, the author draws the conclusion "that the lymphocytosis observed in the majority of cases, which is similar to the response of the blood of animals to small doses of *x*-rays, is due to the effects of the ultraviolet rays contained in the solar spectrum."

PREVOST, J. M. E.: Physiotherapy in the Treatment of Chronic Skin Diseases. *American Journal of Electrotherapeutics and Radiology,* 1920, xxxvii, 235.

The writer considers that all physical agents may be rationally utilized in the treatment of skin troubles since these agents facilitate the exit through the skin of residual products which are normally elimated in other ways.

He points out that in the absence of any dermatosis some physiotherapic applications have a beneficial effect on the skin, viz, vibrotherapy, the static breeze and the CO_2 baths. He says that the physiotherapist is pretty well armed against a great variety of dermatosis-urticaria, eczema, lichen, prurigo, etc., because the static breeze, the various radiations or the high frequency effluves ordinarily subdue the most chronic cases of pruritis.

He considers that eczema should be treated as a forerunner of gout or rheumtism, and to this end the oxidative processes be improved. For this is recommended d'arsonvalization and light baths; local franklinization is used especially for the treatment of the symptom pruritis.

SCHAMBERG, J. F.: The Influence of X-Rays in the Diseases of the Skin. *American Journal of Radiotherapy and Radiology,* 1920, xxxvii, 239.

Schamberg states that with the *x*-ray he cures many cases of eczema which he would not be able to cure by other means. He finds the results satisfactory in chronic papular eczema of the face and particularly so in the recurrent vesicular eczemas of the hands and feet. He says that in many cases formerly diagnosed as eczema, but not known to be due to a fungus-like ringworm, viz, eczematoid ringworm, the *x*-ray is not satisfactory and, with these, chemical reagents are indicated.

ABT, I. A.: Infantile Eczema. *Medical Clinics of North America,* May, 1920, p. 1533.

Abt discusses the subject of diet suggesting that any foods which give a positive skin test be omitted; also that constipation be overcome and overfeeding avoided, though he recognizes that many eczematous children are not overfed. He suggests that when eczema occurs in the breast-fed child cereal be substituted for one or two feedings, but considers it a mistake to wean the child. To the children whose case histories form part of the paper there was given during their treatment in hospital skimmed milk, cereals and vegetable broth.

He advises protection of nervous children against overstimulation.

The local treatment in cases of vesicular eczema consisted of Lassar's paste without salicylic acid, zinc ointment, or ordinary cold cream. The salve is to be applied thickly and retained in place. For the limbs, bandaging; for the face, a mask. The crust is to be removed by a liberal use of olive oil or cold cream, and for this purpose the ointment may be applied on lint gauze or gutta percha and kept in place six or eight hours. The skin should then be washed with olive oil and dried with almond meal. In infected cases moist boric acid dressings are used until the acute reaction has passed. Soothing lotions of lead are then used, followed by a bland ointment.

Where secondary infection, especially in the hairy scalp occurred, moist boric acid was applied to pustular areas; these were followed by moist aluminum acetate dressings until the skin has become soft and the inflammation had subsided. The usual treatment of Lassar's paste, without salicylic acid was then begun.

Eisenstaedt, J. S.: Treatment of Eczema. *Journal of the American Medical Association,* 1920, lxxiv, 667.

In general, the writer says that where the causative symptoms are not known or not controllable the pathologic process should be treated as observed.

In case of vesicular and moist or weeping eczema (eczema rubrum) only the blandest, most soothing, and cooling applications may be used. Alcohol and dusting powder are contra-indicated, also oil silk or gutta percha coverings over wet dressings. Dressings should be changed frequently.

Lead water diluted five to eight times with water, or solution of aluminum subacetate diluted with nine parts of water, or an aqueous solution of ichthyol 1:100 may be used. These should be used cold and the dressing changed every 10 or 15 minutes. The gauze should not be folded in more than three or four thicknesses.

If aqueous solutions are poorly tolerated, an ointment of boric acid and benzoated lard, or a mixture of equal parts of lime water and olive oil may be tried.

If no improvement is made, pastes of greater consistency may be used such as zinc oxid ointment or Lassar's paste.

If these do not answer, it may be necessary to use a stimulating application to form a crust, beneath which repair processes can go on. A 5 per cent silver nitrate solution or a 10 per cent alcoholic solution of tar may be used. After application the part is covered with starch powder.

In more chronic cases where the inflammatory symptoms have disappeared and the patches are covered with crust, diachylon ointment, applied to linen bandages and changed once a day, is recommended. Olive oil is used for cleansing and the ointment applied until all evidence of the disease has disappeared.

Gardiner, F.: Eczema or Seborrheic Dermatitis in Children. *The Practitioner,* London, July, 1920, cv, 47-54.

In the first phase of this condition there is a slight scaling on the scalp or the cheeks of the infant, which readily becomes thickened and reddened; still later the diseased epithelium exfoliates, and moist exuding areas are left. The parts mentioned are at first alone involved, but, where treatment is not carried out, the eruption, in many cases, rapidly spreads all over the face and scalp, being specially severe behind the ears, and then may extend down the neck to the upper part of the trunk. The accompanying itch and resultant scratching are followed by infection of the hands. In chronic cases, the persistent scratching is followed by septic lesions, and, in turn by a chronic thickening. This thickening is due to infiltration of the tissues and a commencing fibrosis which makes the integument dry and leathery-like.

The general health in these cases should not be ignored, for quite apart from the lowering of the vitality of the skin, any failure

in other excretory organs will throw a greater strain on the eliminating function of the skin. For this reason many authorities, especially in America, recommend careful dieting; but while it is known that excess of sugars, starches and some fats is harmful, yet, in the present state of scientific knowledge, no definite dietary can be laid down. The writer is inclined to regard the disease as in great part a result of civilized life. The baby of the prehistoric parents enjoyed more sunshine, or at least light, got more fresh air, and was not exposed to atmospheric fumes and dirt. There was no pressure or irritation from too much clothing, and the skin got an opportunity of growing normally. If these facts are true, then the management of the baby will require more careful consideration.

In the treatment, the author has found it advantageous in the majority of the cases, to apply ointments or lotions on linen or cotton, so as to ensure complete and continuous contact with the disease. The keeping of the hair closely cropped in children past the infantile stage is necessary if the scalp is to be thoroughly treated. Baths should be given daily, either with sufficient permanganate of potash to make them a pale pink color or with about a half a pound of starch. The strength of the ointment, etc., is generally made to vary with the stage of the disease. For instance, a case is often seen to improve with a ½ per cent of salicylic acid in paste, and become inflamed when this is increased to 1 per cent. The best drug for promoting absorption of the thickened areas is crude liquid gas tar, painted on with watchfulness, about once a week.

O'Keefe, E. S.: The Relation of Food to Infantile Eczema. *Boston Medical and Surgical Journal,* Nov. 11, 1920, clxxxiii, 569-573.

O'Keefe reports 70 cases of eczema influenced by diet. The plan followed was, first a general physical examination, then a careful consideration of the child's diet, or of the mother's diet in the breast-fed infants, and finally cutaneous food tests. Forty-one per cent of the patients gave a positive reaction to one or more of the food tests; 12 per cent showed a doubtful reaction, and the remainder were negative to any of the proteins tried. Egg proteins gave a positive reaction in 30 per cent of the cases in which they were used, potato in 20 per cent, casein in 16 per cent, cod fish in 12 per cent, lactalbumin in 11 per cent, wheat in 9 per cent, and corn in 5 per cent. The mother in no instance showed sensitization to the protein to which her child reacted. Ten nurslings were negative to the proteins of human milk. Nearly 20 per cent of the series gave a history of asthma, eczema, or urticaria in some other member of the family. In several of the families one child after another developed eczema as soon as it was weaned. An exacerbation of the eczema was in many instances coïncident with the eruption of a tooth.

Treatment.—Each child was placed on a diet suitable for its age. The nursing intervals and diet of the mother were adjusted in the breast-fed. This included the elimination or reduction of any article in the material diet to which the infant was sensitized. In the case of the older children the offending protein was eliminated from their diet if practicable. This could not be done in the instances where milk was the main or sole article of diet. Here an attempt was made to modify digestible mixture for the particular case. The intimate relationship shown to exist between food and eczema in so large a percentage of these cases justifies the conclusion that dietary regulation is essential in the treatment of this condition.

Chapin, E. H.: Gonorrheal Inflammations in Women. *Ohio State Medical Journal,* 1920, xvi, 498.

Chapin considers that 50 per cent of infected women require operation. He believes that few, if any, cases of salpingitis

ever recover spontaneously but require operation in order to recover; also, that in most cases of infection of the cervix the tubes will sooner or later become involved.

CARR, H.: Use of Tethelin in Case of Multiple Bedsores. *Journal of Laboratory and Clinical Medicine,* 1920, v, 591.

In this instance a successful treatment by tethelin was carried out, tethelin being a lipoid prepared from the anterior lobe of the pituitary body. Carr's case was one of delayed or arrested healing of bedsores which did not improve under any of the customary procedures. Tethelin incorporated in a lanolin base was applied. (Manufacturers.—Tethelin is manufactured by H. K. Mulford Company, Philadelphia, Penna.)

BLAND, P. B.: Pruritus Vulvæ: Its Significance and Treatment. *Therapeutic Gazette,* Detroit, March 15, 1920, pp. 153-156.

The most common physiological condition associated with pruritus vulvæ is menstruation, and nearly all women suffer to a greater or less degree with itching during the menstrual period.

In ordinary simple cases the rigid rules of cleanliness will, in the majority of cases, overcome the condition. If there exists a tendency for the accumulation of smegma and secretion, the parts should be scrubbed with alocholic tincture of green soap and warm water.

In more violent cases the vulva should be shaved and the parts thoroughly scrubbed with a coarse cloth saturated with two drams of tincture of green soap in a quart of warm water. The scrubbing should be repeated for two or three successive days. The patient is then instructed to return, and a generous painting of pure tincture of iodin is applied to the external parts. This causes severe burning and should never be employed until seventy-two hours after shaving. The patient is further instructed to vigorously wash the vulva with the green soap solution every morning and evening. After washing, the parts should be thoroughly dried and a 3 per cent solution of iodin in albolene applied. In addition, the patient is advised to use an alkaline douche twice daily. The douche is composed of the following:

Menthol, two drachms; camphor, two drachms; methyl salicylate, two drachms; sodium borate, three ounces; sodium bicarbonate, three ounces. A teaspoonful of this powder is added to two quarts of hot water (110° F. [43.33° C.]).

PUSEY, W. A.: The Treatment (?) of Psoriasis. *Journal of Cutaneous Diseases,* 1919, xxxvii, 791.

Pusey reports a case, a dentist of 31 years in good health. Three years ago he came for treatment for psoriasis which had been present for 10 years in fairly abundant form in the trunk and extremities.

He returned in 1919 and gave a history of empiric treatments which he had undergone during the past three years. All the treatments except dieting had been given by physicians.

(1) Three years ago, he took 6 doses of emetin, each 1 c. c. ampoule, ¾ grain, at three-day intervals.

(2) Two years ago, he took 3 doses arsphenamin at intervals of 5 or 6 days; he was also given intra-muscular injections of mercury at three-day intervals (not for syphilis, but for psoriasis).

(3) At the same time and following the arsphenamin, twenty-five injections of staphylococcic and streptococcic vaccine were given at three-day intervals. The doses were large enough for considerable reaction from each of first injections.

(4) Last year, with intermissions, Fowler's solution, 3 to 15 drops, was given three times daily (2 oz. in all). When he took enough to make him ill, psoriasis cleared up, but recurred in a month.

(5) One and a half years ago, 5 injections

of "autoserum" were given at five-day intervals.

(6) For the past seven months he has taken a strict non-protein diet—no meats, gravies, eggs, soup, fish, sea food, cheese, nuts or milk (except in dark bread), no cake or food with eggs, no peas or beans (except beans once monthly).

(7) Eight weeks ago his tonsils were removed.

(8) Eight weeks ago seven teeth were removed. The operation on teeth and tonsils were done specifically for psoriasis.

(9) Roentgen-ray exposures were made.

As a result, he lost ten pounds, suffered a reduction of vigor, and found no improvement in psoriasis.

This case is not conclusive evidence of the futility of any of these treatments, but it is negative evidence of some value against most of them.

BERNARD, L. AND BARON: Un Cas de guerison de tuberculose pulmonaire par la Method du pneumothorax artificial. *Bulletins et mémoires de la Société médicale des hôpitaux de Paris,* March 5, 1920, xliv, 3rd series, p. 308.

The authors describe the case of a patient whom they treated successfully by the method of artificial pneumothorax. From 1906 to 1910 the patient—a policeman of thirty-three—had a series of hemoptyses. He entered the hospital in 1911, and was found, by roentgenologic examinations, to have tuberculous, caseous ulcers in the upper lobe of the right lung. There was no fever, but constant cough, and frequent expectoration of sputum containing numerous Koch bacilli. A rest cure resulted in little improvement, and in June, 1912, the authors gave the first insufflation to produce artificial pneumothorax. The collapsing of the lung was difficult, owing to the adhesions at the base. Gradually the adhesions gave way and a good compression of the right lung was obtained, without grave discomfort to the patient, in spite of the high pressure used (+ 14, + 20, and even + 28 measured by the Kuss manometer). In four months the cough had entirely disappeared, and the expectoration was greatly diminished. The general condition was excellent, the temperature normal, and the patient's strength restored.

Insufflations were repeated on an average of every fifteen days, 57 insufflations being given. Twice, through the negligence of the patient, a month elapsed between insufflations, resulting in partial decompression and a return of the expectoration containing bacilli.

Treatment was interrupted in 1914, when the patient became a taxi driver, and later entered the military service. During the war, he discharged his duties as auto driver at the front without a single day of illness. After his demobilization in 1919, he passed a medical examination and re-entered the police service.

SABOURAUD, R.: Les Traitements Internes du Psoriasis. *La Presse médicale*, 1920, xxviii, 53-54.

A review of medical literature shows that widely different measures such as injection of mercurial salts, antitoxic serums (antitentanic, anti-diphtheretic, simple horse serum), and emulsions of killed microbes from the patient's stools have in certain cases a more favorable influence on psoriasis than could be hoped for. There is not the slightest specific action in any of these remedies; they appear to act on the general system and to influence the specific trouble in this manner.

The enterovaccine from the stools (Danysz's method, Pasteur Institute) seems harmless. In a certain proportion of patients there have been practically no results; in other cases the result is very evident, very important for the patient, and sometimes it seems permanent. [The English abstract of this article in the Journal of the American Medical Association is entirely misleading].

WAR MEDICINE AND RECONSTRUCTION

PEMBERTON, R., AND ROBERTSON, J. W.: Studies on Arthritis in the Army. Based on 400 Cases. *Archives of Internal Medicine*, 1920, xxv, 231-240.

There were 400 cases taken into consideration.

In 107 (26.75 per cent) there was apparent absence of demonstrable surgical foci.

In 293 (73.25 per cent) there were demonstrable surgical foci. Of these, 208 (52 per cent entire series, 71 per cent of the 293 cases) showed foci in tonsils.

One hundred thirty-four (33.50 per cent entire series, 45.73 per cent of the 293 cases) were positive for dental focus.

Fifty (12.50 per cent entire series, 17 per cent of the 293 cases) were positive for genito-urinary focus.

Seventy-eight (19.50 per cent entire series, 26.62 per cent of the 293 cases) showed combination of dental and tonsillar foci.

Thirty-eight (9.50 per cent entire series, 13 per cent of the 293 cases) showed some other combination of foci, as dental and genito-urinary, tonsillar and genito-urinary.

Cases	*Per cent*	
92	23	Recovered in apparent absence of demonstrable focus.
184	46	Recovered in presence of focus.
34	8.5	Recovered after removal of foci.
34	8.5	Improved after removal of foci.
28	7	Unimproved after removal of foci.

UNGER, L.: Typhoid and Paratyphoid in Vaccinated Troops. *Illinois Medical Journal*, Feb., 1920, xxxvii, No. 2, pp. 101-3.

The author reports 25 cases of typhoid and paratyphoid in soldiers, all of whom had received at least one course of inoculation against these diseases during their service in the army.

In most cases the fever was not as typical as in civilian patients, and in most cases it subsided quickly. The pulse was usually slow in comparison with the fever. Many of the patients had taken part in strenuous marches, and this was undoubtedly a weakening factor.

"These cases, though few in number, point conclusively to the fact that antityphoid inoculation is only a partial protection. Fifteen of the 25 had been inoculated more than a year, and yet they fell victim to the typhoid diseases. Obviously we cannot afford to lessen our sanitary precautions, but must be even more careful than previously. Re-inoculation should be done at least once a year.

"The very low mortality (4 per cent) is undoubtedly to be attributed to the previous inoculation. This process seems also to greatly lessen the severity of the disease."

In none of the cases was there any history of previous typhoid or of any typhoid or paratyphoid among the soldiers or civilians in the vicinity.

In conclusion the author emphasizes the need for repeated inoculation against typhoid, and the necessity for watchful care in sanitation.

ELIAS, H., AND SINGER, R.: The Effect of War Diet on Diabetes Mellitus in Vienna. (Diabetes Mellitus und Kriegskost in Wien). *Deutsche medizinische Wochenschrift*, May 20, 1920, No. 21, J. 46, p. 561.

The authors conclude that the "war diet", generally speaking, gave the same good results in diabetes in Vienna as it did in Berlin, except as follows:

(1) Aglycosuric diabetics in Vienna show-

ed lower blood sugar values than normally, whereas in Berlin there was a paradoxical hyperglycemia which could be traced directly to the "war diet". (Umbert ascribes this phenomenon to prolonged inanition.)

(2) It seems that in Vienna the older diabetics did much better under "war diet" than the younger ones.

(3) The favorable effect of the "war diet" on diabetics in Vienna seems to have been due to a deficiency of albumin in the diet.

HYGIENE AND PUBLIC HEALTH

ANDREWS, J. B.: The Proposed Health Insurance Legislation. *Pennsylvania Medical Journal,* Jan., 1920, pp. 193-197.

Within recent years in America we have met the problem of industrial accidents by dealing with wage-earners in the mass. We learned that it was very poor policy to do otherwise. The movement for workmen's health insurance is a natural development from American experience with workmen's compensation laws.

The question is often asked, "Why is it necessary that health insurance should be compulsory?" The answer is: We are trying to meet a condition just as we met a condition with our compulsory education system. Those who are in greatest need because of low incomes, or in great need because of lack of forethought, are the very ones who do not get sickness insurance protection under voluntary systems.

The question is also raised, "Why not substitute occupational disease compensation for health insurance?" The reason is that in the majority of cases you cannot distinguish between the disability due to sickness caused by the nature of the employment and similar incapacities due to many other factors, including housing conditions, personal habits and community conditions.

All of the leading countries of the world, such as Great Britain, have found it necessary, after experience with occupational disease compensation, to take up the problem in the broad way of universal insurance against sickness. In England the medical profession threatened to strike at the time of the enactment of the Lloyd George law which went into effect in 1912. The British Medical profession after four and a half years of practical experience under that act reported that they found among physicians a degree of unanimity of opinion somewhat remarkable on a subject which a few years earlier was the most highly controversial that had ever been before the profession. An astounding change of sentiment had occurred in the medical profession because of what they had observed. One of the things they observed most strikingly was that there was an immense amount of sickness which had not received attention before the enactment of universal health insurance legislation. They found that among British physicians there was a great body of opinion in favor of extending the law. They also found the opinions of the insured persons were that they were on the whole satisfied and pleased with the act.

In 1917 the Committee on Health Insurance of the American Association of Industrial Physicians and Surgeons declared that "the principle of health insurance which makes proper provision for the prevention of sickness as well as proper provision for the relief of sickness is most assuredly a sound one."

The Committee on Social Insurance of the American Medical Association concludes its last report saying: "Improved medical care must come from more coöperative and less purely individualistic care from the medical profession. Free choice of physicians by patient, and present relation of patient to physician, and just and assured remuneration for work done by the physician under an insurance plan."

In other words, the needs of the sick wage-earner may be met by health insurance without threatening the progress of medicine.

COOLIDGE, E. L.: The Executive Management of a Clinic for Babies. *Bulletin Lying-in Hospital*, City of New York, March, 1920, xii, No. 1, pp. 57-64.

The writer, who had organized the "Babies Class" fourteen years previous to the writing of this article, realized certain changes were necessary. The first step was to revise the history cards, working out as complete a scheme for history-taking and physical examination as space would allow. A second card was added for subsequent treatment and record of the patient's progress. All essential points are printed on cards which can be quickly filled in for each patient. In addition to the history cards each patient has a follow-up card, these cards being filed separately under date on which the patient is expected to return to the Class. Many mothers are so ignorant or careless that they will go on using the same formula indefinitely unless they are made to report regularly. With the follow-up system it is possible to tell just which patients should report in a given date, and if they do not return after a reasonable length of time, a post card is sent to them. If they are still not heard from, the visiting nurse is sent to the home to make inquiries.

The follow-up cards are also used in another way: as each baby leaves the hospital the head nurse in the ward is expected to fill out a card with the patient's name, address and note of condition at discharge, also whether the baby is fed from breast or bottle. If these cases do not report within a reasonable length of time, post cards are sent to them, or the nurse is asked to call and urge the mother to report at the "Babies Class" to have the baby weighed and an examination made. By this method it is a simple matter to keep track of the babies, and, in addition, the babies are kept well and the mothers educated.

Much extra clerical work is entailed through the follow-up system. To save expense, volunteer workers were installed, obtained from The National League for Women's Service. The volunteers act as doctors' secretaries, no medical knowledge being needed. They take histories from printed cards, weigh babies, and have charge of the follow-up cards and indexes. In this hospital, at the time of writing, there were six volunteers in the "Babies Class",—four are history-takers, one weighs the babies, and the other has the follow-up cards. One woman speaks four foreign languages as fluently as English, and acts as interpreter. The volunteers wear the Red Cross uniforms and are liked and respected by the mothers. They infuse a little of the human element into the rush of work, doing many kind acts for the poorer patients. Most of them are married women with children of their own and they learn many useful things from doctors and nurses. At Bellevue the volunteer service in the Children's Clinic is one of the chief features of the place, as the volunteers render valuable aid to the doctors.

To bring written material up to date it was necessary to write new formula blanks, diet lists for older children, and a paper of general advice to nursing mothers.

Babies Class of the Second Division is held two afternoons a week from 1 to 3 p. m. The medical clerks give out history cards to patients as they come; patients are then taken to history takers, who fill in their part of the history cards; babies are next weighed, and weights noted on cards. Next babies are divided into groups for their special doctors, by the nurse, who also takes temperatures if a history of fever has been given. They are sent into the treatment rooms in turn, all new patients being stripped and ready for thorough examination. After the examination and necessary prescriptions are given, patients are sent into the admitting room to dress their babies and have their prescriptions filled. The nurse is expected to keep careful watch for infectious diseases while patients are waiting to be examined and to isolate suspicious cases until a doctor can examine them.

There is on hand a nurses' call book, in which names and addresses and orders to be carried out are written,— for any baby which needs attention in its home before the next Class.

Considerable time is saved by the use of rubber stamps made for use in prescribing the most commonly used drugs.

This general routine lessens confusion and insures a more thorough plan of treatment for each baby; also it is more satisfactory to physicians working in the Class than any method previously employed in this hospital.

RICHARDSON, F. H.: A Model Pediatric Service for the Modern General Hospital. *Archives of Pediatrics,* Feb., 1920, xxxvii, No. 2, pp. 93-102.

The author points out the necessity for a special pediatric department connected with every hospital. The usual tendency seems to be to tag a children's ward and a children's service to the tail of a general medical, fill the ward with general hodge-podge of surgical, medical and orthorpedic cases, which have nothing in common but a relative similarity of ages, and let each attendant treat all of the patients who happen to be under ten years of age. Such a ward has no settled plan. The Chief of the ward cannot treat the patients of other physicians. The surgeon or other specialist may not understand infant feeding and may therefore do much damage before the pediatrist is called in. All physicians treating children should do so under the direction of a pediatrist.

The duty of the hospital, and therefore also of the pediatric service is first, to cure the sick, second to instruct the medical paternity of the community, and third to educate the lay portion of the community in matters pertaining to individual and collective health.

The consulting pediatrist of a department such as that suggested by the author should be available at all times. The attending pediatrist should make his rounds at a regular fixed time every day, and should visit only a few cases each day, instead of paying a perfunctory visit to all the patients. He should spend enough time with each patient treated to study the case thoroughly, and to teach the associates and clinical assistants who make the rounds with him the important aspects of the cases.

There should be a weekly longer period, the "Grand Rounds", when each case is discusssed and the events of the week gone over by the whole staff in the light of any new developments that may have taken place. Assignment of special topics for preparation outside may be made at this time.

A weekly "General didactic clinic" for the entire hospital staff and outside visiting physicians would also be of great value and interest. There should be two associate attending physicians, one in direct charge of ward work, the other the chief of the clinic. The associates' duties are to act for the attending physician in his absence and to see and treat daily all the cases in the house except those under the special care of the Chief on his didactic rounds. He must supervise the diet, formulas, etc., for the infants, and be informed of all that goes on in the ward.

The chief of the clinic should not only attend, but also teach the clinical assistants, and oversee the therapeutic policy of the service, arrange the schedules, assign cases, etc. Each physician should be given opportunity and should be expected to contribute some research work on pediatrics every year, and a hospital year book of the results would be of great interest.

EDITORIAL: Protection Against Poliomyelitis. *Journal American Medical Association,* April 3, 1920, lxxiv, No. 14, pp. 952.

The use of nasal antiseptics as a protection against poliomyelitis has been highly recommended. However, Flexner and Amos have not had particularly favorable results with such antiseptics, in the case of chronic meningococcus carriers; and the microbe of

poliomyelitis is more resistant then the meningococcus. They also found that chloramin-T, and dichloramin-T, dissolved in chlorcosane, possessed little prophylactic value.

The question has arisen as to whether antiseptic chemicals applied to the mucosa may not be actually injurious. This membrane is thought to function normally to prevent infection. Certain animals are highly refractory to inoculation with virus of poliomyelitis, by way of the nares, apparently because the membrane has the power to destroy or render inocuous the virus which comes in contact with it. The length of time during which the virus may survive depends upon the functional efficiency of the membrane, which is being held under investigation.

This property of the nasal mucosa seems to be distinct from any specific protective virtues of the blood. The poliomyelitic immune serum is thought to meet the virus in the subarachnoid space. The low morbidity, even in severe epidemics of poliomyelitis, lead one to the belief that some individuals possess some peculiar means of protection. If the normal nasal mucosa is part of this defensive system, it should be conserved in a normal, healthy state. Local antiseptics are often merely chemical irritants and they should never be used indiscriminately, especially in poliomyelitis.

DIAGNOSIS

Mackay, A. E.: Urinary Frequency. *Northwestern Medicine,* March, 1920, xix, 68.

Mackay points out that while increased frequency of urination is only a symptom, it is often the early and only evidence to indicate not only disease of the urinary apparatus, but many nervous, organic or constitutional disturbances. Normal frequency varies. The female, as a rule, voids less frequently than the male, while both seldom void during the night except when led to do so from early training or the ingestion of much fluid before going to bed. The average daily quantity of urine is about 50 ounces; the mean capacity of the bladder is from 10 to 16 ounces varying largely from the constant amount of fluid taken by each individual.

Urinary frequency may be due, first, to nervous or reflex causes, where the urinary tract itself may not be affected as individuals of generally irritable nervous system, in sexual neurasthesia, in early tabes, spinal meningitis, myelitis or disseminated sclerosis. The psychic state, especially under the strain of prolonged fear or excitement, will often cause frequency that will persist long after the usual polyuria noted under such circumstances subsides.

Frequency caused by reflex irritation from rectal, anal or vulvar ulcers or fissurea, or the presence of intestinal parasites may exist without real bladder involvement but will lead later to an infectious cystitis of the reflex irritation if not removed.

The author next discusses frequency due to the urine content and diseases of the urinary tract. The urine may have a constant high acidity, excessive calcium oxalate crystals, phosphates or urates due to errors in diet or metabolism. Each of these conditions may irritate a healthy bladder to regular frequency. Unfortunately these etiological factors are often overlooked until the chemical irritation produces a chronic congestion with subsequent infection.

In localities where easy access may be obtained to toilets and urinals a polyuria due to such diseases as diabetes mellitus, diabetes insipidus, chronic and interstitial nephritis may not be noted unless the patient complaining of frequent urination is ordered to save a total twenty-four hour specimen for examination. In the urethra, some causes of frequency may be quite obvious, such as acute and chronic gonorrheal in-

flammations, strictures, and newgrowths, although careful investigation is often necessary, especially when the bladder participates in the infection.

Even a mild cystitis will cause frequency usually during the day, but as the the inflammation becomes more chronic, urgency at night sets in and rest and change of position give but temporary relief. The author emphasizes the danger in presuming that a cystitis is the real cause of the frequency. The bladder infection may be and often is secondary to disease higher up in the urinary tract. In these cases when the symptoms are slight and the urinary frequency persists after treatment, a careful examination to exclude the presence of pyelitis, pyelonephritis or tuberculosis, becomes imperative. Renal infection and especially tuberculosis begins often gradually and pursues a relentless course for a long period without any other symptom than frequency in urination.

Neoplasms of the bladder may cause frequency but usually from a secondary inflammation of the bladder; the same may be true of a calculus in the bladder, although sometimes the urinary frequency may in such a case be modified by a rest or movement.

Diseases and abnormalities of the genital organs may be a prolific source of urinary frequency. Here it is well to bear in mind that the genital and urinary organs are in close anatomic relationship. The prostate surrounds the urethra and as age advances encroaches upon the neck of the bladder and even invades the bladder itself. The seminal vesicles are closely attached to the bladder and their ducts empty into the urethra. In the male the bladder is firmly supported by the prostate and padded by areolar tissue surrounding the seminal vesicles, while in the female the bladder below has only the loose support of the yielding vaginal vault and is easily affected by malpositions or enlargements of the uterus.

Prostatic disease is obviously a source of frequency both in acute inflammations and chronic changes which supervene with advancing age, but the author desires to especially note here the rather common error of attributing to the prostate a frequency markedly nocturnal which is due either to the presence of an old endovesiculitis or to the effect of a widespread perivesiculitis.

In women the pregnant uterus undoubtedly may be a cause, and displacements or fixations may be the exciting cause that can easily be overlooked, especially where there is a coexisting infection of the bladder. This effect is often attributed to cystocele, for which Mackay is quite sure many vaginal operations for relief might be obviated if the cystic or renal condition was more carefully considered, as a trigonitis with persistent frequency is more often the cause rather than the effect of the cystocele.

McDonagh, J. E. R.: Erb's Syphilitic Spinal Paralysis. *Venereal Diseases,* London, 1920, p. 153.

This condition occurs in late syphilis and is characterized by a slow and gradual development of a spastic paresis of the lower extremities, with spastic gait, motor paralyses, slight muscle tension, slight increase of tendon reflexes, the sensory disturbances being either slight, severe, or absent and sphincter weakness, bladder especially. The condition is not very uncommon, and, in McDonagh's experience, benefits from treatment if diagnosed early, but invariably recurs when it remains uninfluenced, eventually proving fatal from nephritis secondary to the cystitis. The premonitory symptoms of chronic myelitis are characteristic and deserve mentioning. The patient first notices that he tires easily, his legs feel like lead to him and his sexual power has quite or nearly gone. He may complain of pain in the back and of a sense of constriction around the waist. The reflexes are exaggerated, and an ankle-clonus and extensor response may be elicited. Months may elapse between this stage and the onset of paraplegia which may be materially delayed provided treatment is prescribed. The author had under observation a man, aged 56, who contracted

syphilis twenty-four years previous to time of treatment and was well until about five years previous to the writing of this article, when he found the patient complained of incontinence, and could not walk any distance without immediately getting tired. After an intravenous injection of arsenobenzene he developed a general twitching of his muscles, which became less and less pronounced after each of the succeeding injections (four). In McDonagh's experience, this kind of reactionary inflammation is only to be met within late degenerative and general vascular lesions.

Pirie, A. H.: Case Reports in the Medical Clinic, Royal Victoria Hospital, Montreal. *Canadian Medical Association Journal*, 1920, x, 455.

A new method is described for confirming the diagnosis of cirrhosis of the liver by radiography. Oxygen is injected into the abdomen according to the method of Dr. Stewart, New York. The liver, spleen, kidneys, tumor masses, ovaries, and uterus are thus rendered visible. Three cases are mentioned, in the third of which a doubtful diagnosis of cirrhosis of the liver was confirmed by this method. The method is still, however, experimental.

Fussell, M. H., and Pancoast, H. K.: A Roentgen-ray Sign of Perinephritic Abscess. *The American Journal of the Medical Sciences*, Jan., 1920, clix, Part 1, No. 574, p. 7.

Two cases are reported. The first patient had a renal calculus. Diagnosis was made, and a stone was removed from the left side. Eight days later a mild fever developed, becoming septic in type and continuing for two months. A fluoroscopic examination demonstrated fluid surrounding the left kidney which showed a definite wave when agitated. The renal region was opened and pus was removed from the capsule.

The second patient had septic fever for three weeks with pain referred to the lung base. An *x*-ray of the patient in recumbency showed a normal arch to diaphragm, and was positive for gall-stones. No fluid was demonstrated on the plate. A fluoroscopic examination of the patient in upright position showed the left diaphragm flat and immobile. When the body was moved quickly, it represented the same wave as was observed in the first case. Operation disclosed from 200 to 300 c. c. of pus surrounding the upper pole. Pus about the right kidney will not be expected to give the sign because the liver intervenes.

Gaillard, J.: Radioscopic Examination of the Heart and Aorta in the War Tachycardias. *Archives des maladie du coeur*, 1920, xiii, 40.

Orthodiagraphic examination of 34 patients with irritable heart showed 15 cases with normal hearts and aortas. In 2 cases the heart was normal, but there was an expansion of the transverse arch of the aorta. In 14 cases there was more or less marked hypertrophy of the left ventricle and one of these also showed a wide transverse arch. Four cases showed a distinct expansion of the aorta.

Null, M. M.: The Importance of a Routine Examination of the Duodenal Contents in Selected Cases. *Illinois Medical Journal*, Aug., 1920, xxxviii, No. 2, pp. 126-129.

This article is a plea for the more frequent examination of duodenal contents as a routine practice, along with gastric analysis, *x*-ray and examination of feces.

Hemmeter of Baltimore, in 1895 and 1896, was probably the first to devise an apparatus for the removal of duodenal contents by means of the duodenal tube. It was not until Gross, in May, 1909; Einhorn, in 1909; and Palefski, in 1911, improved the apparatus and the technic, that the procedure became practical and applicable to the work

of the clinician. The importance of the work must not be underestimated, as it opens up a new field for diagnosis in a hitherto inaccessible place. It helps the clinician to understand what happens to the food after it leaves the stomach; it helps in the understanding of the intestinal secretions, secretion of the pancreas or bile, until it is recovered in a decomposed state at the end of its course. Further, the infections of the pancreas and gall-bladder and also typhoid carriers can be studied best by means of the duodenal tube.

It must be remembered that the duodenum is that portion of the intestine most commonly affected by ulcers. It is the place where the acid from the stomach is neutralized and made alkaline with the formation of gas, which mingles with the food. It is the portion of the gut nearest the liver where bile may be drawn off just as it leaves the gall-bladder or hepatic duct. It is here that samples to test the enzymes of the pancreas in their pure state may be obtained, before they are mixed with food. Also it is in the duodenum that the bacteriology of this portion of the intestinal canal can best be studied in regard to typhoid carriers, cholecystitis and acute pancreatitis, and, finally, it is here that a sample of the finished product of gastric digestion may be obtained.

One other point of importance is the potency of the pylorus. It is possible to ascertain its exact size, with some skill in the use of duodenal instruments. The ideal tube is one which can be passed the easiest, obtain samples in the shortest time, and with least discomfort to the patient. The author believes the best results can be obtained by the use of a glass smoothed tube, No. 7 American, with an Einhorn or modification tip. It is his opinion that the Rehfuss tube is too large and the long diameter of the bulb too great. The Gross instrument is also too large. The Palefski instrument does not have the proper relation between the long and short axis of the bulb. The writer has no sympathy with the method of passing the tube at night and removing the contents the next day. It seems best to make fractional samples as the tube passes down. He has sometimes removed samples 150 to 200 c. c. from the teeth to determine intestinal digestion.

The technic for the passing of the tube is as follows: The patient should be in a sitting position; the bulb of the tube is placed well back into the throat, and the patient told to swallow. At the same time the tube is pushed further into the gullet. No water should be used. As soon as 20 cm. is reached (the tube must be graduated) the patient is placed on his right side, slightly forward, with buttocks high, and instructed to gradually push the tube in about an inch every three minutes. The bulb finds its way along the lesser curvature of the stomach without doubling up the tube on itself. In this way the short axis of the bulb will be guided into the inlet of the pylorus. If the bulb strikes the fundus of the stomach it will take it hours to be brought up to the inlet and adjust itself to the axis of the outlet. Not infrequently in this way a loop of the tube is passed through before the bulb, thus causing a kink in the tube, and making the whole procedure useless. The Rehfuss tube is too stiff and will frequently strike the fundus. Some other tubes are delayed by the size of the bulb. A sample of the stomach contents may often be removed at 40 cm. on the tube. At 50 cm. the tube is engaged in the pylorus. Beyond that, it reaches the duodenum. A syringe is preferable to a bulb to attach to the tube in withdrawing the contents, or a still better method is to allow the fluid to siphon out.

The normal findings are considered first, as follows: The first sample at the pylorus is stomach contents and no bile, unless there is regurgitation. The next sample beyond the pylorus is yellow with bile, frothy from the evolution of CO_2 gas and highly acid. A little distance beyond at the papilla of Vater, on a fasting stomach, the content is golden yellow, not frothy, alkaline about 20 titrated with methylorange and decinormal hydrochloric acid solution. It also contains the pancreatic fluid, some mucus and no food. The microscope shows the usual findings of

bile and a few bacteria. It must be borne in mind that this is a mixed sample of duodenal secretion, bile, pancreatic juice and, perhaps, stomach contents. But they are fresh, yet unmixed with food, and may be examined just as they come from the glands.

The pancreatic secretion contains a milk ferment differing from the stomach ferment in that it will not coagulate boiled milk; it will not coagulate in an acid media, and it takes from 30 to 60 minutes while the rennin in the stomach takes only 5 minutes to coagulate milk.

The three digestive ferments coming from the pancreas are, according to the Einhorn scales, in the following proportions: amylopsin 6 mm., steapsin 3.5 mm., trysin 2.8 mm. According to the methods of simple analysis they are present in marked quantities.

In pathological samples many deviations from the normal are found. Frequently it is greenish in color or brown, or almost black, turbid—containing many bacteria, yeast cells, broken-down epithelium and blood from ulcers, granular deposits from the gall-bladder and even small fragments of stone. The enzymes may be easily studied and checked with the normal. If either one or the other is absent or weak in quantity, it may be due to an intolerance for some particular class of food with the resulting symptoms. If there is an acute inflammation of the pancreas there may be an increase of enzymes; if there is a decrease of enzymes there may be a neoplasm in the head of the pancreas. Cholecystitis may be recognized or suggested by the character of the bile especially if it is extracted by slight pressure over the gall-bladder. Many still unknown disorders will probably be cleared up when the bacteriology of this portion of the intestinal tract is fully understood.

The writer does not consider the Einhorn tubes for testing the pancreatic ferments practical for the average physician, as they are bunglesome and tedious, but think they are probably the best means available at the present time.

CHEMICAL PHYSIOLOGY, AND EYPERIMENTAL MED‹CINE

von Wedel, H. O.: The Complement Fixation Test for Tuberculosis. *Journal of Immunology,* March 1920, v, No. 2, p. 159.

The results of 6,128 complement fixation tests made on 1,207 sera from 1,000 patients points to the fact that this is not a 100 per cent test for the diagnosis of tuberculosis. A considerable percentage of sera from incipient and far advanced cases apparently contain insufficient antibodies to fix complement, no matter what system or what antigen is used for the test. This fact, therefore, precludes the probability of a 100 per cent test based on complement binding antibodies in the patient's serum.

A great many antigens and many systems have been tried by various workers but even the most favorable reports on large series bear out this statement. Numerous favorable reports of small series have been published but apparently none has been confirmed where the percentage of positive findings, with a series of unselected active tuberculous cases of all types, has been more than 80 per cent—unless there was at the same time a marked degree of non-specific fixation.

About 70 per cent positive results appear to be the average finding, with all types of unselected active tuberculous cases, for many thousands of complement fixation tests made by many serologists, using tubercle bacillus suspensions or tuberculins as antigens. The reactions are weakest when the patient exhibits few, if any, symptoms of tuberculosis, while they are most definite and strongest in the incipient and moderately advanced cases exhibiting marked symptoms. The

results are therefore more confirmatory than actually diagnostic in the largest percentage of cases. However, when used intelligently along with the clinical history, the results justify its more extended use.

A positive reaction repeated twice seems to prove fairly conclusively that the patient is openly manifesting an active tuberculous process.

The weakening of the reaction from a strong positive to a weak positive or negative reaction, is apparently a good prognostic sign in incipient and moderately advanced cases exhibiting clinical improvement, while at the same time this change with a far advanced case in a poor clinical condition is a very bad prognostic sign.

STARLING, E. H.: Output of Urea. *Human Physiology,* 1920, pp. 800 and following.

On a normal protein diet the urea contains about 87 per cent of the total nitrogen of the urine; on an excessive protein diet it may reach 90 or 95 per cent; on a low protein diet it may fall to 60 per cent (Folin). This indicates that part of the urea nitrogen comes from the food without having even formed part of the urine nitrogen. Folin distinguishes these two nitrogen sources as endogenous, *i. e.,* derived from the tissues; and exogenous, *i. e.,* derived from the food direct.

A dog given a large protein meal gives out in from two to five hours 50 per cent. of the total nitrogen of the meal as urea. Digestion in a dog takes about eight hours; hence we see that by far the greater part of the protein nitrogen is excreted almost directly after absorption as urea in the urine. This urea comes from the end-products of protein digestion in the intestine, namely, the amino-acids.

The formation of urea from the amino-acids is accomplished by deaminizing ferments which are found mostly in the liver, though they are said to be found in other organs. The ammonia set free is rapidly converted into urea and this conversion is performed mainly in the liver.

Pawlow and Nencki regard the liver as an organ which normally protects the rest of the body from ammonia produced in the alimentary tract, by converting this substance into the innocuous neutral body, urea.

"We thus see that the urea, which appears in the urine so rapidly after an ingestion of protein, does not signify a total disintegration of the protein molecule, but is merely the result of the throwing off of the nitrogenous part of the protein molecule by a process of deamination.

"The important part of the energy metabolism of protein is thus not the origin of the urea, but the fate and nature of the substances that are left after deamination".

In proteid starvation some urea continues to be formed, continuing to be the most abundant nitrogen constituent of the urine. It must, therefore, be classed as one of the probable products of tissue metabolism. Some of it may represent protein deaminized for the production of energy. This deaminization would occur in the tissues and not in the liver, as in the rapid formation of urea after a hearty meal.

ALESSANDRINI, P.: Present Status of Vagotonia and Sympathicotonia. *Policlinico,* Roma, March 29, 1920, 379.

The author states that the assumption of vagotonia as opposed to sympathicotonia as the explanation of visceral neuroses has much promoted the study of neuroses.

His experience with drug tests in 100 persons has confirmed the general view that the subject is not so simple. No two of his subjects responded alike, some of the organs showing greater susceptibility than others, and the findings testifying to dissociation; some reacted alike to both epinephrin and pilocarpin; others did not respond to either. Each organ has its isolated balance, independent of all other analogous systems in the organism.

Clinical distinctions based on vagotonia and sympathicotonia are artificial.

Remer, J., and Witherbee, W. D.: The Cause of X-Ray Burns. *Medical Record*, 1920, xcviii, 183.

The authors show the fallacy of the theory that low voltages which produce rays of low penetration are the cause of burns, since these rays are more easily absorbed by the skin. Experiments made to test *x*-ray treatment of ringworm of the scalp prove that apparently the quality of the ray and the absorption of those of long wave length have little connection with biological effects in the skin. The effect on the skin is determined by the quantity of rays. A high spark-gap produces more rays than the same dose with a low spark gap.

Recent experiments were made on a patient's back with the following factors:

$$\frac{5 \text{ m. a.} \times 9 \text{ in. S. G.} \times 9\text{-}16 \text{ min.}}{6 \times 6D} = 33\tfrac{3}{4} \text{ sec.} = 1\tfrac{1}{4} \text{ skin units} = 5 \text{ H.}$$

This is an erythema dose without a filter. The filtered erythema dose using 3 mm. of aluminum is as follows:

$$\frac{5 \text{ m. a.} \times 9 \text{ in. S. G.} \times 7.7 \text{ min.}}{6 \times 6D.} = 2\tfrac{1}{2} \text{ skin units} = 10 \text{H.}$$

Biologically, the erythema produced by these two doses is apparently the same. The dose with 3 mm. of aluminum takes about ten times as long to produce an erythema as it does without aluminum.

By increasing the thickness of the filter and decreasing the spark gap the time necessary for a filtered erythema dose, *i. e.*, 2½ skin units, can be progressively increased. Although decreasing the spark gap in unfiltered dosage lengthens the time of exposure for an erythema dose, the time ratio between the lower voltages and thickness of the filter is many times greater than those of the higher voltages. One might select a formula with a very low voltage and consider that one gave forty or fifty erythema doses.

If, in describing the technic of filtered dosage, 2½ skin units are adopted as the standard for an erythema dose, it can be used with the same degree of accuracy as is the erythema dose of unfiltered dosage.

Witherbee, W. D.: Number of Radiograms and Roentgen Ray Burns. *American Journal Medical Sciences*, 1920, clx, p. 184.

Commenting on the work of Remer and Witherbee, the author gives formulas and tables, based on the principle that roentgen ray burns, alopecia, etc., depend entirely upon the quantity of roentgen ray reaching the skin. The maximum number of exposures that can be made in a given case without producing burns, etc., can be obtained by the formula used for determining unfiltered dosage.

Quimby, E. H.: The Effect of Different Filters on Radium Radiations. *American Journal of Roentgenology*, Oct., 1920, vii, No. 10, p. 492.

The author performed animal experiments with various metal mediums, in order to determine the best filter for deep therapy, *i. e.*, one which gives a penetrating beam with as little secondary radiation as possible. He found that brass gave less secondary radiation than lead, and was therefore more suitable to be used as a filter. Also, brass does not rust, is hard and keeps its shape, is inexpensive and easily procured. "Furthermore, 2 millimeters of brass is sufficient thickness to remove the soft radiation. Since the curves for 1.96 and 3.04 millimeters of brass are practically parallel, the extra millimeter of brass has not increased the relative penetration appreciably, but it has absorbed 4 per cent more of the original penetrating radiation, thus decreasing the efficiency. This argument applies more strongly when 2 millimeters of lead are used as a filter, for in this case about 10 per cent of the penetrating radiation is absorbed."

"*Conclusions.*—Equivalent filters of different metals have been determined, which give the same intensity of ionization in the apparatus described."

"When the radiation filtered through these "equivalent" thicknesses is transmitted through tissue, the ionization produced is not the same."

"For thin filters, up to half a millimeter of brass or its equivalent, the radiation transmitted by brass, in turn is more penetrating than that from aluminum. When the absorption by the tissue becomes great in comparison to that by the filter, this effect is obscured."

"For thick filters, equivalent to one millimeter of brass, or more, this effect is reversed, the radiation transmitted by lead having a larger percentage of soft radiation than that transmitted by brass or aluminum."

"To obtain the necessary penetrating radiation for deep therapy, in general a combination of filters is necessary. When substances, of high atomic weight are used as filters, a considerble part of the emergent radiation is easily absorbed in tissue. Hence the necessity of a secondary filter or low atomic weight to remove this soft radiation. The analysis by tissue of the transmitted radiation enables us to determine what additional filtration is necessary when any metal is used as the primary filter."

"For practical reasons brass is a good substance to use as primary filter. Its secondary radiation is not very intense and can be removed to a sufficient extent by a few millimeters of rubber, which have the same effect as an equal thickness of tissues. A thickness of 2 millimeters of brass is sufficient for deep therapy."

"The results obtained in these experiments are directly applicable to the treatment of patients, since the absorption by the tissue used is the same, within the limits of experimental error, as that by living tissue."

MATTHEWS: Output of Urea. *Physiological Chemistry,* 1920.

"In acute yellow atrophy of the liver, interstitial hepatitis and cirrhosis of the liver, there is a very extensive degeneration of the liver cells. In all these cases there is a reduction of the amount of urea in the urine and an increase in the ammonia content. The change, however, is not so great as one would expect were the liver the sole source of the urea. In phosphorous poisoning one may have a great increase in the ammonia and a decrease in the urea."

BAGG, H. J.: The Response of the Animal Organism to Repeated Injections of an Active Deposit of Radium Emanation. *Journal of Cancer Research,* Oct., 1920, v, No. 4, p. 301.

The author injected an "active deposit" of radium emanation into two dogs. Successive doses were given, and the physiological reactions noted. The animals were killed by ether anesthesia. Postmortem showed a general fatty and granular degeneration of the liver, with capillary congestion. The kidneys were congested and showed slight granular degeneration of the tubule cells. The spleen was thickened and pigmented. The bone-marrow of the femur was devoid of lymphoid cells and fatty. The lungs were congested and emphysematous.

In these experiments there was a prompt reduction of white blood-cells, and a remarkable reduction in the relative percentage of lymphocytes. The apparent red blood-cell destruction was slight in comparison with the white blood-cell changes. While the number of white cells may be reduced by as much as 80 per cent of their total number from the effects of an initial dose, the simultaneous reduction in the number of red blood-cells is less, and amounts to a reduction of about 25 per cent.

Physiologic reactions consisted in digestive disturbances such as severe vomiting and diarrhea, loss in body weight, rise in temperature, increases in the total nitrogen content of the urine, the urea, creatinin, uric acid and the total phosphates.

"From a consideration of the results of

the investigation as a whole, one may say that in the intravenous use of the solution form of the active deposit of radium emanation, as a therapeutic agent in cancer or other diseases, it is necessary to keep in mind the fact that after an initial dose of such radioactive substance the animal organism is irretrievably altered, and from then on will not give the same reaction to a repetition of the initial dose.

The organism, as seen in the dogs of this experiment, is able to compensate for a severe initial dose of the radioactive substance, but after a certain point has been reached the natural protective adaptations on the part of the organs affected become inadequate to meet the demands of the organism as a whole, and the effects of the intoxication are greatly aggravated."

"When the active deposit of radium emanation is used intravenously as a therapeutic agent, great care should be taken to grade the dose in accordance with the general physical condition of the patient, which should be determined by frequent urine and blood analyses; and if more than one dose is given during the treatment, the second dose should be made smaller in accordance with the strength of the original dose."

FOOTE, J.: Egg Sensitization of Hidden Origin in Eczema of the Infant. *International Clinics,* 1920, iv, 30th series, p. 212.

"While Fordyce in 1911 wrote of a probable anaphylactic origin of certain eczemas, it remained for Schloss in a later preliminary report of certain experiments to conclude therefrom that some conditions called eczema were due to "food allergy". Since that time the fact has been established that young children with eczema, when tested for a cutaneous reaction, give positive evidence that they have been sensitized by the protein constituents of one or more substances used in food."

These tests consist in (1) injecting a weak solution of prepared protein between the layers of the skin,—*intradermal method,* or (2) rubbing an abraded or cut portion of skin with protein dissolved in decinormal solution of sodium hydroxid,—*cutaneous method.* The latter method is safer and more reliable.

Various investigations have shown that egg-white or some constituent of egg frequently causes skin irritations, and tests for protein sensitization are usually made in children who have eggs in their dietary. The author reports cases of children who had a negative history of feeding with eggs, and yet who showed decided reactions when tested for allergy to egg protein.

Case 1.—Boy of one and a half years,—weeping and crusted type of eczema on face, chest and hands. Patient was well-nourished and had negative family history.

"The present dietary is milk, cream of wheat, and graham wafers.

Test for wheat—no reaction. Control, negative.

Test for milk—no reaction. Control, negative.

Test for egg—both white and yolk show, after 10 minutes, an area of white skin, slightly stellate and raised, 1 cm. in diameter, surrounded by a reddened area."

The cause of the reaction to egg proved to be the graham wafers fed him, which, like many sweetened preparations for children (graham crackers, sweet crackers, sweet zwieback, etc.) contained egg albumin. No elimination of such crackers in this case caused an immediate cessation of acute symptoms.

Case 2.—Boy of 3 years, with eczema eruption over entire body. He had been given an egg every day. When this was omitted a symptomatic cure occurred. Later eczema reappeared on his forehead and face. He had not eaten egg, but a few days before the eruption had appeared, had accidentally broken an egg over his head and face. Whether or not he swallowed some of the egg is not known. A report a week later showed rapid improvement.

In another case of eczema in which improvement was gradual there was a sudden

recurrence. The reaction to egg was violent, but no egg had been fed the child, the eruption proved to be due to a small piece of cookie secretly fed to the child. The primary attack was not due to any such cause. Probably the infant had an "anaphylactic family history". "That children of this class are peculiarly susceptible to later sensitization to proteins, may explain why the omission of the offending protein from the dietary of the eczematous child does not result in the complete symptomatic cure which might logically be expected. There are no doubt many such children in whom protein sensitization is facilitated by the exudative diathesis, and this sensitization does not initiate, but always seems to aggravate, the eczematous condition".

Where the etiology of sensitization to proteids is not clear, a positive reaction is proof of a food allergy, and any food which is being consumed at the time should be regarded as a potential cause until excluded by tests.

Stadie, W. C., and van Slyke, D. D.: Effect of Acute Yellow Atrophy on Metabolism and Composition of Liver. *Archives of Internal Medicine,* 1920, xxv, 693.

Case.—A woman, aged twenty-nine years. Chemical analyses were made of the blood and urine in a case of acute yellow atrophy for three days before death. The liver was also analysed at necropsy three hours after death. The nitrogen metabolism and the acid base balance of the patient were particularly observed. An increased excretion of ammonia and titratable acids was observed in the last days of illness, with a fall of plasma bicarbonate to slightly below normal the day before death. Deviations from normal were, however, too small to indicate acid intoxication as a significant factor. The belief is confirmed quantitatively that amino-acids are formed by autolysis in the atrophying liver, that they circulate and are excreted as such in unusual amounts. The excretion of amino-acids was not apparently due to any increase in their rate of formation as the total protein katabolism was not abnormally nor unusually rapid. The excretion seemed to be due to a loss of power to deaminize amino-acids at an even ordinary rate.

Support is given to the theory that in the deaminization of amino-acids and the synthesis of urea, the part borne by the liver cannot be entirely assumed by the rest of the body.

Einhorn, M.: Studies on the Action of Various Salts on the Liver after Their Introduction into the Duodenum. *New York Medical Journal,* 1921, cxiii, No. 8, p. 313.

Meltzer suggested the use of magnesium sulphate injections into the duodenum for relief of biliary colic. He considered the colic a spasm of Oddi's sphincter.

Lyon employed magnesium sulphate instillations into the duodenum to relax the sphincter of Oddi, and contract and empty the gall-bladder, and then used it for diagnostic purposes. Lyon believed he could, by siphonage, obtain bile separately from the common duct, the gall-bladder, and the liver. He exercises gentle aspiration. After the instillation of the magnesium salt the flow was of a light yellow, then it became dark brown, changing to yellow later. Lyon considered the dark bile as coming directly from the gall-bladder. The author has found that this discoloration goes on very gradually and a reverse or a diminution of the color reaction takes place later. The author judges that if the dark flow signified pure bile it would occur and disappear more suddenly after the bile was emptied.

He considers the color changes as due to the action of magnesium sulphate on the liver and the bile. Bile with magnesium does not change its color, but its specific gravity. The salts were given in different strengths, in 60 c. c. doses, injecting them into the duodenum of the same patients in the fasting conditions, on different days. The changes in specific gravity as described in bile mixtures with salts are found in the

duodenal contents after the instillation of the salts into the duodenum. The color changes are found after instillation of concentrated magnesium sulphate and sodium sulphate solutions into the duodenum. There is no relaxing effect of the magnesium. It seems that magnesium or sodium is in part the instigator of the colon reaction, although there are other substances which do the same. It is probable that the sulphates, when excreted by the liver with the bile undergo changes in color. The high concentration of the salts may also have something to do with the color change. "The higher the percentage of the salts, the more intense the color at its acme and the higher the specific gravity. This can be explained by the action of these salts on the liver, but not by an opening up of the gall-bladder for then the gall-bladder bile would always appear in the same state and not in variations." The author observed a similar color play in patients whose gall-bladder had been removed, after the magnesium sulphate instillation. The variability in the intensity of color reaction in different individuals seems to be dependent upon the activity of the liver.

Therapeutically, the beneficial action of the saline aperients on the liver is well established. The salts seem to stimulate the liver. The aperient waters ordinarily taken by mouth, might, the author suggests, be more effective, if instilled directly into the duodenum.

INTERNAL MEDICINE

Simpson, J. R., and Noah, H. G.: Report of Two Cases of Lung Abscess Following Tonsillectomy, under Local Anesthesia, in Tubercular Subjects. *Pennsylvania Medical Journal,* March, 1920, xxiii, No. 6, pp. 322-323.

From the several papers dealing with this sequel of tonsillectomy it would appear that aspiration of pieces of tonsillar tissue, infected blood or infected material squeezed out of the tonsillar crypts, while the patient is under the anesthetic, is responsible for the production of lung abscess. Simpson and Noah contend that aspiration of lung abscess did not account for the production of the lung abscess in the two cases whose clinical histories they report. They believe the following points favor hematogenous infection as the cause.

(1) The patients, one a male, aged 18, the other a female, aged 24, were operated on under local anesthesia in the upright position.

(2) The mouths and throats were in a septic condition before and for some time after operation. In one case considerable sloughing of the right tonsillar fossa and posterior pillar occurred.

(3) Late occurrence of symptoms point to blood-stream infection.

(4) The occurrence of the abscess at the site of the tuberculous lesions which, in both cases, was in the upper and middle lobes.

The writers conclude that, during or following operation, septic material enters the veins, passes through the right heart to the lungs, and there finds, in the presence of tuberculous lesion, suitable soil for the production of an abscess. The possibility of aspiration of infected material as a cause of pulmonary abscess is not to be denied, yet more cases occur as a result of hematogenous infection than is generally supposed.

HURLEY, V.: Surgical Shock. *The Medical Journal of Australia,* April 10, 1920, i, No. 15, pp. 331-6.

The author bases his conclusions upon observations made during the recent war.

Shock may be defined as "that depressed activity of the bodily functions which frequently follows upon severe injury, either by wounds or in surgical operations, and also after hemorrhage from any cause." There is falling blood-pressure, with contracted arteries, a normal heart, and a normal vasomotor center, and deficiency in the volume of blood in circulation. This applies not only to cases of actual hemorrhage, but also to those where there is no reason to suppose that there has been any great loss of blood.

ETIOLOGICAL THEORIES.—The author mentions and disproves the etiological theories of shock, such as that it is due to: (1) exhaustion of the bulbar centers, and especially of the vasomotor center, (2) heart-failure, (3) acapnia (Henderson), (4) acidosis, and (5) suprarenal exhaustion.

He considers the lowered blood-pressure the most important feature in shock. If the blood-pressure is restored and maintained the other symptoms disappear. In order that the body tissues may carry out their functions it is vital that there should be:

(1) An adequate supply of circulating blood.

(2) A sufficient blood-pressure.

By means of the blood the body-cells are kept supplied with oxygen; when this supply is reduced, even for an hour or two, harmful metabolic changes occur, and irreparable damage results. In man lowered blood-pressure affects first the vasomotor center, and later the respiratory center.

In addition to the lowered blood-pressure, there is also a diminished volume of blood circulating in the vascular system. It may be observed not only following hemorrhage from wounds, but also where none has occurred (the exemia of Cannon).

There is an increased hemoglobin and red corpuscle content of the blood in the capillaries, as compared with that in the veins. Instead of the normal difference of 3 per cent there is often a difference of 30 per cent, showing that "there is a concentration of the blood in shock, as well as a diminution in volume, due to plasma escaping from the vessels, perhaps also by sweating." Malcalm has confirmed this percentage increase of red corpuscles in shock, and maintains that the arteries are constricted rather than dilated.

The loss of blood volume alone may not be serious, unless combined with other injurious factors. In experiments on cats it was found that the removal of one-fourth of the blood was rarely followed by dangerous consequences, but that when this was continued with other factors also attended by some degree of fall in blood-pressure, such as cold, injury, etc., a much smaller loss of blood resulted in permanent and serious fall of blood-pressure, attended by other signs of wound shock.

CONTRIBUTING CAUSES.—The author discusses the following factors:

(1) *Exposure to Cold.*—This is one of the most important factors in exaggerating wound shock. The effect of cold is to lower the blood-pressure, depress the vital functions and produce slowing of the heart beat.

(2) *Injury to the Tissues, Especially the Muscular Tissues.*—The liability to shock seems to increase with the extent of the tissue injured, especially of the muscular tissue injured. Section of the spinal nerve above the origin of the nerves supplying the injured part, in experimental cases, had no effect, but clamping of the main artery and vein, or excision of injured tissue, resulted in improvement. This would indicate that some chemical product of tissue injury must be absorbed into the circulation from the injured tissues.

During the injury the blood-pressure falls, and, if the fall is not very great, spontaneous recovery may occur. In severe cases the primary fall is usually followed by a slow secondary fall, ending in death. In either

case a slight hemorrhage has the effect of enormously exaggerating the state of shock.

It is known that chemical substances are set free from almost any tissue as a result of injury or even temporary stoppage of the circulation. Histamin, which powerfully dilates the capillaries, but not the arterioles, produces a condition of profound shock, if given in large doses.

(3) *Anesthetics.*—Surgical operations exaggerate the state of shock. It is very important that cyanosis should not be allowed to occur, as the body tissues are then exposed to all the evil effects of diminished oxygen supply. Excess of carbon dioxid causes an initial rise of blood-pressure, but a subsequent fall with peripheral vasodilation. Defect of oxygen, even when there is no excess of carbon dioxid, is apt to leave behind a condition in which there is a progressive fall of blood-presure.

"Haldane thought that administration of oxygen might be of value in shock. It is not so much that the arterial blood is insufficiently oxygenated, but that the blood is not supplied to the tissues with sufficient rapidity, owing to the low blood-pressure. A more effective treatment is to raise the blood volume by increasing the volume in circulation.

Henderson's suggestion of increasing the carbon dioxid in the air breathed is logical. But the amount of oxygen must not be decreased.

Treatment.—To raise the blood-pressure:

(1) We may use drugs which constrict arterioles, the peripheral resistance being thus increased; the same force of heart-beat as before produces a higher pressure.

(2) We may raise the pressure by increasing the volume of circulating blood, without altering the peripheral resistance.

Any increase in blood-pressure resulting from the use of vasoconstrictor drugs, such as ergot, adrenalin, pituitrin, etc., the author considers is more or less counteracted by the constriction of the arterioles of the organs affected. There is little object in causing the arteries to contract, in any case.

A better method is to increase the volume of circulating blood, "thus insuring a sufficient supply to the organs, and especially to the cerebral centers. By intravenous injection of fluid in sufficient quantity the blood-pressure is raised, the fluid lost to the body by hemorrhage is restored, and also that lost to currency by stagnation in the capillaries."

Artificial fluids, such as saline solution, Ringer's solution, etc., have been found to be useless in restoring blood-pressure, and are often harmful.

The use of hypertonic solutions has also been recommended, but it has been found that the temporary rise in blood-pressure by this means lasts very little longer than that of Ringer's solution, as it is soon counteracted by water attracted from the tissues, and, of course, the diminished colloid concentration acts as before.

On the assumption that acidosis is a factor in causing shock, others have substituted alkaline solutions, such as sodium bicarbonate (from 3 to 4 per cent) for saline solution. The low blood-pressure and deficient oxygen supply to the tissues in shock cause the "acidosis", and, it is more rational to increase the oxygen supply by improving the circulation by attempting to neutralize the acid once produced." The "acidosis" is innocuous, and may even be beneficial, in that the increased hydrogen ion concentration of the blood may stimulate the respiratory center to increased activity, and so increase the supply of oxygen.

The question of the viscosity of the circulating fluid must also be considered. Ringer's solution and water, besides containing no colloid with an osmotic pressure, have a viscosity only one-third that of blood.

"Glycerin has sufficient viscosity but is diffusible, and has a deleterious effect on the heart and corpuscles.

"Starch and agar are indiffusible, but have such large molecules that their osmotic pressure is practically nil.

"Foreign proteins affect the kidney and are excreted in the urine. There is also the question of anaphylaxis, especially as all wounded men have had antitetanic serum injections.

Gelatin (6 per cent) and gum (7 per cent) have the same osmotic pressure and the same viscosity as blood. The osmotic pressure of these colloids is not sufficiently high to prevent hemolysis of red corpuscles so they must be dissolved in 0.9 per cent sodium chlorid. Gelatin has the disadvantage that on sterilization it loses much of its viscosity and there is also the possibility of unkilled tetanus spores and the risk of intravascular clotting.

For the above reasons gum arabic was decided on. "It is innocuous, non-hemolytic, and non-agglutinating and easily sterilized, without loss of viscosity."

While Bayliss' gum solution is of great value, blood transfusion is much more effective and to be preferred wherever possible. The chief difficulty to its general application is that of obtaining suitable donors when needed.

There is every reason for believing that blood corpuscles administered in transfusion live and perform their usual functions in the blood of the recipient. Blood films taken at intervals after transfusion show no evidence of abnormal corpuscles. There is no evidence of free hemoglobin in the circulating blood, and no hemoglobinuria.

A prolonged low blood-pressure results in a loss of excitability of the bulbar centers, and if this has lasted very long no recovery is possible, even by blood transfusion. It is therefore evident that to be effective it must also be prompt.

Animal blood cannot be used for this purpose, as severe toxic symptoms are produced. Also the blood of a donor must be proved to be compatible with that of the proposed recipient before transfusion. Moss classified the blood of all individuals under four groups. The blood of a donor belonging to any one group may be safely given to another person of the same group, but not necessary to one of another group. The incompatibility manifests itself in hemolysis and agglutination, and these two reactions run parallel, so that it is only necessary to test for one or the other, the agglutination reaction being the most practical. The blood grouping may be shown as follows:

Serum	*Red Corpuscles*				*Percentage*
	1	2	3	4	
1	—	—	—	—	8
2	+	—	+	—	40
3	+	+	—	—	10
4	+	+	+	—	42

\+ = agglutination
— = no agglutination

From the table it may be seen that corpuscles of Group 4 are compatible not only with the sera of their own group but with that of each of the other three groups. They may therefore be called "universal donors"; fortunately they represent nearly one-half of all individuals.

In desperate cases of shock, blood transfusion combined with gas and oxygen anesthesia has rendered successful operation possible where it was absolutely impossible under any other method of anesthesia.

Crile, G. W., and Lower, W. E.: Surgical Shock. Second Revised Ed., Vol. VI., Philadelphia, W. B. Saunders Co., 1920.

Crile describes the outstanding phenomena of shock as follows: (1) Reduced metabolism; (2) loss of body heat; (3) loss of muscular power; (4) loss of mental power; (5) increased respiratory rate—increased ventilation of the lung; (6) increased pulse-rate; (7) lowered arterial blood-pressure; (8) cold, moist skin; (9) pallor, sometimes a yellowish tint; (10) shrunken faces; (11) cyanotic nails; (12) dull, listless expressionless eyes, with heavy lids; (13) increased H-ion concentration of the blood—diminished reserve alkalinity; and (14) concentration of the blood—relatively high red blood count.

Crile declares the indicated treatment consists in:

(1) Combating existing causes of exhaustion.

(2) Establishing a state of negativity

through natural sleep and through agencies that accomplish in part what is accomplished by sleep. The common causes of exhaustation are:

(*a*) *Acute Anemia from Low Blood-pressure.*—Transfusion of blood is indicated. Except in chest and in head cases, the foot of the bed of an exhausted patient should be elevated.

(*b*) *Cold.*—The patients should be warmed by blankets, hot air and electric-light bath. The last named treatment is preferred.

(*c*) *Pain.*—Relieve pain by making every possible readjustment of dressings, by arranging for maximum confort. If these means do not afford relief, and cyanosis is not present, morphin should be given.

(*d*) *Thirst.*—If possible, a solution of 5 per cent glucose and 5 per cent sodium bicardonate should be given per rectum by the Murphy drop. Fluids should be given by mouth or subcutaneously. In shock the organism is in urgent need of fluids. The natural avenues of absorption are preferable to intravenous injection.

(*e*) *Psychic Drive.*—Overcome worry and anxiety by reassurance and attention.

(*f*) *Acidosis.*—Secure a good exchange of fresh air. In grave cases, give oxygen; push fluids and give intravenously a 5 per cent solution of sodium bicarbonate with 5 per cent glucose. Adrenalin is of doubtful value.

(3) In the establishment of the state of negativity, the most complete state of negativity and, therefore, the most potent reparaive agent is sleep. The substitutes for sleep are: (*a*) nitrous acid—oxygen anesthesia; and (*b*) opium and its derivatives. If there is no cyanosis and shock is severe, deep opium narcosis should be established. Excitement, worry, anxiety, pain, rough handling, wet, cold, stimulants, such as strychnin, camphor, mustard, alcohol, should be avoided, also chloroform and ether anesthesia, rough operating, large doses of morphin in the stage of deep acidosis. Comfort, solace, warmth, elevation of foot of bed, hot drinks, should be employed, also morphin except in the stage of deep acidosis. Blood transfusion should also be employed. If an operation must be performed, let it be feather-edged, quick, gentle, and under nitrous oxid-oxygen, and if practicable, local anesthesia as well. In grave cases early, not late blood tranfusion is advised. If the patient has been long in deep exhaustion and presents a yellow-tinted color and is in a deep mental stupor, indicating impending final cellular dissolution, then give an intravenous infusion of 500 c. c. of a 5 per cent solution of glucose in 5 per cent sodium bicarbonate solution—perhaps with the addition of a few drops of adrenalin. These measures should be followed by an ample transfusion of blood, as much even as 1000 c. c.; and, if indicated operation should be resorted to immediately under nitrous oxid-oxygen or local anesthesia, or both combined; otherwise, under short ether or spinal anesthesia. Whatever the anesthetic, if an operation is necessary, it should be performed deftly and quickly and with a minimum of blood loss.

Osler and McCrae: The Principles and Practice of Medicine, 1920, pp. 689 and 674.

Theories of Uremia.—*Page 689.*—The old view of Traube is that the symptoms of uremia, particularly the coma and convulsions, are due to localized edema of the brain.

Foster describes three forms among which are two cerebral edema types. In this there is defective water and salt excretion with a resulting edema.

Symptoms.—(*a*) Mania.—This may come on abruptly in an individual who has shown no previous indication of mental trouble, and who may not be known to have nephritis.

(*b*) Delusional Insanity (Folie Brightique).—Cases are by no means uncommon. Delusions of persecution are common and the patients may commit suicide. The condition is of interest medico-legally because of its bearing on testamentary capacity. Profound melancholia may also supervene.

Congestion of the Kidneys.—*Page 689.*—

Passive congestion; mechanical hyperemia, is found in cases of chronic disease of the heart or lungs with impeded circulation, and as a result of pressure upon the renal veins by tumors, the pregnant uterus, or ascitic fluid.

STRAUSS, A. A.: Congenital Pyloric Stenosis. *Surgical Clinics of Chicago,* Feb., 1920, iv, 93.

Dr. Strauss describes his modification of the Fredet-Rammstedt operation which consists in unfolding the mucosa of the tumor by chilling it out and in splitting the hypertrophied muscle of the tumor and using it as a flap.

He operated on 103 cases with 3 deaths: 7 weight-selected cases; and 32 in moribund condition at operation.

He describes the diagnostic methods including the fluoroscopic technic. This takes only 2 or 3 minutes; does not require undressing and gives absolute information. The child is allowed to nurse a bottle containing a small amount of bismuth in the mother's milk; this can be watched from esophagus to pylorus. When a small amount of liquid squirts through the pyloric opening the pylorus clamps down tightly and at once rhythmic snake-like contractions begin in the pylorus independently of the rest of the stomach.

GALAMBOS, A.: Transitory Glycosuria of the Renal Type. The Relation of Renal Diabetes to Phlorizen Glycosuria and Diabetes Mellitus (Transitorische Glykosurie mit Senalen Typus. Das Verhaltnis des renalen Diabetes zur Phlorizin. Glykosurie und zum Diabetes mellitus). *Deutsche medizinische Wochenschrift,* May 27, 1920, No. 22, J. 46, S. 600.

Galambos states that although the symptomatology of so-called renal diabetes has been well described and is easily differentiated from diabetes mellitus, nevertheless it is usually regarded as an extremely rare condition. He is inclined to believe that it is not its occurrence but its recognition that is rare. He could find in the literature reports of nearly two dozen cases, to which he adds two personal cases, both of which he had an opportunity to observe within a very short time.

One of his cases occurred in a twenty-eight-year old man who had been afflicted with stomach trouble since the age of 12. At 23, he was operated on for gastric ulcer. At the present admission to the hospital, he showed in addition to evidences of a recurrence of the ulcer, a slight glycosuria. His urine was of a specific gravity of 1.025, free from albumin; sugar 0.2 per cent daily quantity, 1200 c. c. The reduction, polarization and fermentation tests proved the sugar to be glucose. Levulose and pentose reactions were negative. The patient had no symptoms of diabetes and was unaware of his glycosuria. The latter did not disappear on the withdrawal of carbohydrates. When the latter were administered in greater quantities the urinary sugar content did not increase. Ingestion of from 130 to 500 grams of carbohydrate within 24 hours had no influence on the sugar excretion. The amount of sugar excreted within this period varied from 0 to 6 grains, the average being 3 grams. There was a period of aglycosuria which ran parallel with the largest carbohydrate intake (500 grams).

The author cites V. Noorden who claims that in mild and recent cases of diabetes mellitus the degree of glycosuria may have no relation to the carbohydrate intake; but in renal diabetes this is the rule. A patient with the latter disease may react toward glucose in the same manner as a true diabetic or as any other individual with a reduced sugar tolerance. In true diabetes the increased glycosuria is directly associated with a markedly increased blood sugar content, whereas in renal diabetes, owing to the lower renal sugar threshold a very slight rise in the hyperglycemia is sufficient to produce or increase glycosuria. In diabetes mellitus the blood sugar concentration and

the glycosuria are increased not only by the sugar content of the diet but also by the starch and albumin content of the latter. In renal diabetes, only glucose increased the glycosuria, and this may be associated with a slight increase of the blood sugar content.

Phlorizin raises the sugar permeability of the kidney and gives rise to glycosuria even in healthy individuals. The author has found in diabetes mellitus the hyperglycemia diminished and the glycosuria increased after an injection of phlorizin. The mechanism of renal diabetes is generally speaking similar to that of phlorizin diabetes, because when phlorizin was administered in renal diabetes its manifestations became twice as marked. Whereas in healthy individual an injection of 1 cg. of phlorizin was followed by a glycosuria of from 0.5 to 1 per cent, it was followed in a renal diabetic by a glycosuria of 3 per cent (within 8 hours 12 grams of sugar were excreted).

FARGES, F.: Contribution to the Study of Diabetes (Contribution a l'etude du Diabete). *La Presse médicale,* July 14, 1920, xxviii, No. 48, pp. 475-7.

It is often said that diabetes is due to a disturbance in the metabolism or the utilization of carbohydrates. This hypothesis is not exempt from criticism. It is illogical, because it takes effect for cause, since it presupposes the fact that all or a part of the sugars ingested pass through the system without modification, and are so eliminated. As a matter of fact, however, the sugar in the blood has its origin in the glycogen of the liver and not directly in the diet.

Besides, this hypothesis applies to all the sugars, although fructose and lactose do not result in a hyperglycemia or a glycosuria in diabetics. Even when glucose and saccharose are taken with the lactose, no further reducing properties are conferred on the diabetic urine.

In order to demonstrate this fact, it is necessary to establish for each patient a definite diet, in order to be able to know its component elements, and thus study their metabolism in the patient. A milk diet appears best for this purpose, since it contains only one carbohydrate—lactose—and only one albuminoid—casein—and also because a patient can maintain his equilibrium for a long time on milk.

The author treated his patient as follows: on admission to the hospital, the patient was given the ordinary hospital diet for two days, during which time careful urinalysis was made. On the third day, a diet consisting of two liters (4.221 pints) of milk, and a definite amount of lactose was prescribed. If the urine became sugar-free, eggs and meat were added to the food allowed.

Twenty patients were treated in this manner; one was admitted with the following urinary findings:

Total quantity in 24 hours...	2100 c. c.
Quantity of sugar per liter..	20 grams.
Quantity of sugar per day....	42 grams.

For eight days, without any other change in diet, the patient received 20 grams of lactose; at the end of that time, urinalysis showed:

Total quantity in 24 hours....	2 liters
Quantity of sugar per liter..	7.85 grams
Quantity of sugar per day..	15.7 grams

The patient was then put on 2 liters of milk and 100 grams of lactose, with the result that the urine became sugar free.

Besides patients who become sugar free under the influence of lactose, there is a group of diabetics in whom the amount of sugar rapidly diminishes to a certain level, beyond which it is impossible to go. To this fixed quantity of sugar eliminated, the author has applied the name "*threshold of sugar excretion*". This threshold is a fixed one for each patient. The higher the threshold, the more marked is the hyperglycemia. The sugar excretion threshold is important in prognosis. When it is below 50 grams, the prognosis is favorable. When it is 200 grams or more, the patient will probably die in several months.

The liver is an intermediary between the

sugar excreted and diabetes is a disturbance in one of the physiologic functions of the liver, *i. e.*, in its sugar excretion.

Hood, C. T.: Hypertension and Arterial Fibrosis. *New York Medical Journal*, July 31, 1920, cxii, 152.

Hood discusses this subject under five headings: (1) Physiological hypertension; (2) hypertension in the young; (3) hypertension due to arterial fibrosis; (4) hypertension due to chronic nephritis; and (5) hypertension due to hyperthyroidism.

He believes that increased tissue fluid pressure produces, first increased capillary resistance; second, cardiac hypertrophy; third, arterial fibrosis. He is also convinced that it is the presence of sodium chlorid in the tissue that causes increased body fluid pressure in the capillaries.

Sodium chlorid is utilized in the body for two and possibly three purposes: (1) The hydrochloric acid of the gastric juice is derived from it; (2) it probably plays some rôle in the alkalinity of the blood; and (3) it retains the fluids in the tissues. Therefore, he argues, if the body fluids contain an excess of salt, the intratissue fluid pressure is raised, capillary resistance is increased leading finally to cardiac hypertrophy with arterial fibrosis.

Bearing in mind that the human body requires from 30 to 60 grains of salt in 24 hours for perfect health, and then recalling how much salt is daily consumed by the ordinary individual, it is not difficult to see how capillary resistance is increased. But it is not necessary that the individual be an excessive salt eater. The question is: To what extent is the salt eliminated from the body? Sodium-chlorid is eliminated, aside from that used in the manufacture of hydrochloric acid, first, by the tears, second by the lungs, and third and principally by the kidneys.

The clinical application of these facts by Hood may be summarized as follows: In the first type of hypertension the individuals require an increased systolic pressure to maintain a circulatory equilibrium. By putting these individuals upon a salt poor diet, their excess of sodium chlorid becomes filtered out. This relieves the kidney of the work of eliminating the chlorids, allowing greater elimination of nitrogen and area, thus making it possible to allow a more liberal protein diet, but keeping them on a salt poor diet also lowers the systolic and to some extent the diastolic pressure, to the normal for the individual.

The patients belonging to the second type of hypertension, are between the ages of 35 and 45; they are usually over-weight, are good feeders, drink large amounts of fluids and take an excess of salt. Their urine may show a normal amount of chlorids; the blood stream being able to hold only so much sodium chlorid, the kidney rarely eliminates an excessive amount of chlorids, although this may occur only for a short time, but in those cases, even with their excessive taking of fluids, the volume of urine is but little increased. Placing these individuals upon a salt free diet for a few weeks, with a restricted diet in amount without tea, tobacco and coffee, (or only in moderation) gives remarkable results. Cutting out salt from their diet means practically also the cutting out of all meats. Although the amounts of liquids necessary for them is reduced to the minimum, it is surprising to see how the volume of their urine is increased. They lose weight for a few weeks, rapidly at first and slowly later. Gradually the volume of urine becomes normal, both the systolic and diastolic pressure diminish, the dyspnea or exertion ceases, and sleep improves.

In the third type, the results are not so brilliant, but renal function becomes more efficient; this lowers the systolic and diastolic pressure, and improves the general condition of the patient.

In the fourth type, with chronic nephritis, not so much can be achieved, but it is remarkable what a salt free and properly balanced diet, if persevered in for months, will do for these patients. Their hearts and ac-

companying secondary anemia also need careful watching.

In the fifth, or hyperthyroid type, Hood has obtained excellent results by putting these patients on a salt poor diet, in addition to rest, an ice bag over the thyroid, hydrobromate of quinin and some cardiac stimulants such as spartein and strephanthus.

To aid in the elimination of the chlorids the author has found but one drug of value, and that is potassium nitrate, five grain doses to the ounce, and fifteen drops in half a glass of water three times a day. In chronic nephritis, this drug is of little avail, except in the true arteriosclerotic type. In chronic nephritis, other than arteriosclerotic, with a urine of low specific gravity, esenin, 1/40 grain t. i. d., increases chlorid elimination for several weeks; then the chlorids fall to almost nothing, and the urea and nitrogen elimination increases often to a marked extent. Iodids and iodin, the author says, are of no value whatever in the treatment of hypertension or arterial fibrosis. The internal secretions, he believes, do not in any way alter his hypothesis.

Joslin, E. P.: Diabetes of Long Duration. Severe Diabetes Versus Severe Acidosis in Diabetes. *Medical Clinics of North America,* Jan., 1920, iii, 873-886.

Long life and diabetes are compatible. Thirty-four of Joslin's patients have outlived the standard tables for the expectation of life for the age of the onset of their disease. The age of the individual is of first importance. The disease is of shortest duration during the first two decades, next in the third decade, but after that varies little. The favorable factors are obesity, good environment, careful treatment in the first years of the trouble, and intelligence of the patient. The last factor is the posibility of gall-stones.

Statistics show an argument in favor of early operation for gall-stones in diabetic patients. The patient should be free from sugar and evidences of acid poisoning, but in an emergency, operation may be performed in the presence of sugar. Operation must be performed swiftly by a surgeon of extreme skill; gas-oxygen should be employed.

Cases of severe acidosis in diabetes with recovery are reported by Geyelin and Dubois, (*J. A. M. A.,* 1916, lxvi, 1532) and by Fitz and Bock, (*Quart. J. Med.,* 1919, xii, No. 48). Joslin here reports another case of impending coma successfully treated. He conserved tolerance of stomach for liquids, and administered 1000 c. c. hot liquids every six hours. If difficulty is experienced, the salt solution can be given intravenously or even subpectorally. (Subpectoral use of salt solution reported by A. L. Chuts recently—new possibility of treatment.)

Morse, J. L.: Constipation and Eczema in an Infant from an Excess of Fat in Modified Milk. *Medical Clinics of North America,* Sept., 1920, iv, No. 2, pp. 585-594.

The patient, a girl of fifteen weeks, is small but well-nourished, with good color, and normal organs. The skin on the cheeks, buttocks, thighs and elbows is a little reddened and thickened. There is slight rosary, denoting rickets. There being nothing in the physical examiniation to account for her failure to gain more rapidly, it is almost certain that the cause is to be found in her feeding. The eczema is additional evidence, for in many instances in infancy, eczema is due to some error in the composition of the food, usually an excess of fat. The presence of constipation also suggests that the fat in the food may have been excessive.

The baby was weaned at seven weeks, and given a modified milk mixture consisting in:

Top 8 ounces from 2 quarts	14 ounces
Lime-water	2 ounces
Water	24 ounces
Milk-sugar	4 level tablespoonfuls

Constipation ensued, and the baby gained only slowly, probably because the excessive richness of the diet took away her appetite

so that she took less at each feeding. She received a total of 30 ounces in twenty-four hours.

Later the amount of top milk was increased (by 2 ounces) and the same amount of water left out. The sugar was increased. She received 30 ounces in twenty-four hours. She did not want her food, the constipation persisted, and the eczematous eruption increased. Milk of magnesia was given—2 ounces, an excessive amount—and resulted in looseness of the bowels. It was therefore discontinued, and the constipation returned. The baby gained little weight.

The author prescribes the following modified milk: "Pour off or, better, dip off with a cream dipper all the cream which is visible on a quart bottle of milk. This is "gravity cream." If there is not enough cream on 1 quart of milk, take off the cream from another quart of milk and mix the cream from the 2 quarts together.

"The milk which is left after the cream has been removed is "skimmed milk." Mix as follows:

Gravity cream 3½ ounces.
Skimmed milk 9½ ounces.
Lime-water ounces.
Boiled water 15 ounces.
Barley-water ounces.
Milk-sugar 2 rounded tablespoonfuls and 1 level tablespoonful.
Heat to and keep covered for minutes.
Keep on ice.
Give baby 4 ounces at a feeding.
Feed at 6, 9, 12, 3, 6, 9 or 10, and once in the night."

"It will probably not be necessary to give the baby anything for the constipation after a few days. In the meantime it will be wise to put a teaspoonful of milk of magnesia, more or less, as the case may be, in the 6 p. m. bottle. Later we will give the baby 1 or 2 tablespoonfuls of orange juice daily."

"The eczema, which is slight, will probably quickly disappear when the food is changed. In the meantime the baby must be kept from scratching, and no water should be applied to the affected areas. They can be kept clean with sweet oil, mineral oil, or lanolin. It will also be wise to keep them lightly covered with some bland ointment like Lassar's paste without the salicylic acid, zinc oxid ointment, or cold cream."

Cooper, N. A.: Case of Erysipelas with Complete Loss of Vision. *New York Medical Journal,* Nov. 20, 1920, cxii, No. 21, p. 817.

"The patient was a female, aged twenty-eight years, very poorly nourished, having had continuous fever for ten days with a large patch of erysipelas on the external surface of the right thigh. The heart sounds were feebly audible; pulse weak and of low volume, with slow and shallow breathing, with normal liver and spleen outline. There was total blindness of both eyes, one eye having been sightless from infancy and the other affected only a few days after her present illness. This patient, who was delirious at times, was treated on ordinary lines with antistreptococcic (erysipelas) serum injections in large doses. In all about eight injections were given, together with appropriate local treatment."

"When the patient came under my care for treatment on October 1, 1919 she was in an extremely bad condition, highly anemic, prostrated, with the heart sounds feebly audible. She had a rapid, weak pulse combined with low muttering delirium. The spleen was normal, but the liver was greatly enlarged and tender. A further dose of 25 c. c. of antistreptococcic serum was given and the patient was put on a simple mixture of iron and given brandy in liberal doses as a stimulant. The temperature which had been 99.6° F. (37.88° C.), rose after three or four days, and at the same time there was a marked increase in tenderness in the hepatic region. Emetin injections of a quarter grain were given every day for three days. After the third injection of emetin the temperature

dropped to normal. Pain and tenderness in the liver disappeared and the patient was a trifle better. Three more injections were given and the fever remained below normal. During this period the only drug that was administered to the patient by mouth was liquor ferri perchloridi several times a day. The blood picture showed, instead of a leukocytosis, a marked leukopenia, which is very unusual in such diseases, with the red blood cells 2,020,000 to the cubic centimeter and a few microcytes. There were no other changes in the blood. About eight days after the complete fall in temperature, large abscesses suddenly developed on the face of the patient, in both the arm pits and on the buttocks. Autogenous vaccine was prepared and four injections were given. This prevented the development of further abscesses and inhibited the ripening of those already formed. There were no other pyemic complications. About ten days after this the vision of the patient improved. The leukopenia was less marked. On November 2, 1919, the patient told me that she could then see things as well as she used to before her illness. During all the time that she was under my care, she was kept on a mixture of iron which was given in increasing doses. It was due to the iron that her vision was restored and her general health improved so quickly. Though the antistreptococcic serum, the autogenous vaccine, and emetin each played their own part against the infection and its pyemic complications, her recovery was due to the iron."

Conclusions.—"(1) No case of loss of vision in erysipelas has been recorded as far as I know.

"(2) The vision was completely restored under simple treatment of iron mixture.

"(3) Hepatic and pyemic complications yielded rapidly to emetin and autogenous vaccine treatment.

"(4) Exceptionally quick and complete recovery was due to the iron, which acted as a specific more than the other drugs which were used.

"The patient left the hospital in perfect health."

EINHORN, M.: Dilatation of the Stomach. *Diseases of the Stomach,* Vol. I, 6th revised ed., New York, William Wood, 1920, p. 385.

Acute dilatation of the stomach (when there is stagnation of the food in the stomach) is occasionally found as a result of an acute inflammatory process of the gastric mucosa in consequence of gross errors in diet and the like. It may, although quite rarely, develop alarming symptoms and may even lead to a fatal issue. Whether acute dilatation of the stomach is due to a paralysis of the gastric muscles, or whether it is caused by a spasmodic contraction of the pylorus, is as yet undecided. Probably both conditions exist. In these instances it appears that nothing passes from the stomach into the duodenum; anything which is taken in the way of food or drink collects in the stomach and distends it. The presence of gastric juice may still further increase the amount of liquid within the organ, and in this way aggravate the condition. The prolonged stagnation of chyme within the stomach gives rise to manifold processes of decomposition and fermentation. Vomiting usually occurs and brings temporary relief. The indirect cause of an eventual fatal issue is quite difficult to state. It may be due to auto-intoxication or to some more direct injury to the vagus nerve. A similar condition occurs off and on soon after operations on the stomach or other abdominal organs.

DOWNES, W. A.: Congenital Hypertrophic Pyloric Stenosis. Review of One Hundred and Seventy-five Cases on Which the Fredet-Rammstedt Operation Was Performed. *Journal of the American Medical Association,* July 24, 1920, lxxv, p. 228.

The writer made 175 operations between 1914 and 1920. He describes the operation and treatment and summarizes his conclusions as follows:

(1) If a satisfactory history can be obtained and if the findings of a proper physi-

cal examination are correctly interpreted the diagnosis of congenital hypertrophic pyloric stenosis should be made in practically every case.

(2) If the patient is observed from the onset of the symptoms, medical treatment may be tried for a period of not longer than 10 days, provided the weight loss does not exceed 20 per cent during this time. If at the end of this period the child does not show definite improvement, operative interference is indicated. Any patient, continued under medical care and suffering a relapse should be operated on at once.

(3) All cases in which there is a history of a period of ten days or longer in which the data as to previous weight are lacking—and in which the patient is not in very good condition—should immediately be classed as surgical.

(4) The mortality among the patients coming to operation within four weeks from the onset of symptoms is less than 8 per cent.

(5) The results following the Fredet-Rammstedt operation are permanent and the cure complete.

Necropsies were obtained in 2 cases in which the patient died from other causes a year and a half after the operation. The pyloric tumor had entirely disappeared in both, and the pylorus appeared completely normal except for light omental adhesion at the site of the scar.

Downes believes that in 99 per cent of cases the diagnosis can be made by palpation. He considers that a palpable tumor plus projectile vomiting, loss of weight, peristaltic waves, gastric retention, etc., suffice to establish a diagnosis without the aid of a roentgen examination.

In the discussion of his paper Dr. Strauss stated that he insists on a roentgen ray and a fluoroscopic examination in every case. He considers that the roentgen ray can determine whether the case is to be treated medically or surgically: If from 70 to 80 per cent of the bismuth meal goes through within four hours, there will be recovery under medical treatment whatever be the clinical symptoms or the tumor findings. If less than 70 per cent goes through, operation is indicated. He gives his mortality in 167 cases, 107 operated and 67 treated medically, as 3 per cent.

Dr. Bevan advised local anesthesia. Dr. Downes disagreed, recommending ether.

Dr. Rasohoff stated that Dr. Palmer of Cincinnatti, had found 5 cases of enlarged thymus among 20 with pyloric stenosis. Dr. Downes had not found an opinion as to the frequency of enlarged thymus.

Duval, P.: Sur les rétrécissements sous-vutériens du duodénum. *Bulletins et mémoires société de chirurgie de Paris*, June 15, 1920, xlvi, 887.

Duval reports 5 cases of duodenal stenosis below Vater's ampulla. Two cases were secondary to biliary lithiasis, two to pancreatic cancers and one to a colon malformation.

The first case was a woman, the end of whose bladder had perforated the second portion of the duodenum in the thickness of the insertion of the transverse colon; a large calculus was lodged halfway between the duodenum and the bladder. The second case was that of a woman upon whom Quénu had performed cholecystectomy for lithiasis. She had a stenosis of the second portion of the duodenum secondary to an operative tear followed by suture. The vesicle was completely fused with the intestinal wall. The two other cases were stenosis of the third portion of the duodenum by cancer of the body of the pancreas.

Radiology enabled Duval to determine two facts: the dilatation of the duodenum and duodenal antiperistalsis. Duval observed in two of the cases pronounced antiperistalsis of the second portion of the duodenum. He saw a violent contraction of this segment of the intestine which repelled its bismuth contents into the stomach through the open pylorus. Then the pylorus allowed the bismuth gruel to pass again into the intestine. Duval believes that this duode-

nal antiperistalsis is of great value, because, by indicating the presence of stenosis, early operation is made possible.

In another case of a young girl of twenty-three, who had had a peritonitis by perforation and an appendectomy ten years before, the radiographic diagnosis showed that there was stenosis of the third portion of the duodenum. Laparotomy revealed a duodenum, the first and second half of which and the right half of the third part were gigantic and about four finger breadths in width. The right colon showed no adhesion, and the colon did not adhere at all except at the left of the upper mesenteric artery. Duval considered this case a typical one of chronic obstruction of the third part of the duodenum by traction of a mobile right colon on the transverse colic artery. Duval performed a duodenojejunostomy across the mesocolon with a supplementary jejunojejunostomy between the two ends of the anastomosed loop.

Eggleston, E. L.: A Critical Review of Five Hundred Cases of Gastric and Duodenal Ulcer. *Journal of the American Medical Association,* Dec. 4, 1920, lxxv, 1542-1547.

Five hundred cases of peptic ulcer were carefully selected by Eggleston from the records of the patients under observation in the Battle Creek Sanitarium. In this study he has excluded cases occurring prior to 1912, as he is convinced that before this time the study of ulcer was not made in conjunction with the roentgenologist as an aid in diagnosis. Of the 500 cases, 415 were classed as duodenal and 85 as gastric.

The treatment used in the majority of these cases was a modification of the Sippy method (Sippy, B. W.: Gastric and Duodenal Ulcer. *J. A. M. A.,* May 15th, 1915, cxiv, 1625-1630), rest in bed for from one to three weeks, and small and frequent feeding with moderate amounts of a mixture of sodium bicarbonate, bismuth subcarbonate and magnesium oxid. When there was any decided delay, alkaline lavage just before retiring was continued until pain during the night disappeared and stasis was relieved. The use of fomentations, and the moist abdominal bandage worn constantly during the early days of treatment, were found to be of decided advantage in relieving pain. Every effort was made to discover and relieve any possible focal infection.

There is every reason to believe that one great cause for failure as a result of medical treatment is carelessness with reference to diet. These patients, who require a restricted diet are often not satisfied until they are able to return to their old habits of diet, which may have been a great factor in causing their trouble originally. In all cases of peptic ulcer, the patient must understand that he is to follow a restricted diet, not only during the time he is under the immediate care of his physician, but for months, or even years, afterward. Not only should this apply to the medical case but to those treated surgically as well. The experience with tube feeding as introduced by Einhorn has been very satisfactory in a number of cases.

The writer concludes: (1) If peptic ulcer, particularly duodenal ulcer, is observed early in its history, and if the patient will submit to a carefully planned treatment for a reasonable time and will follow up this treatment by a carefully regulated dietary regimen over a period of some months, one can be sanguine of obtaining complete cure.

(2) In uncomplicated cases of long standing, proper medical treatment provides relief in at least 70 per cent of the cases.

(3) In the great majority of cases in which the symptoms disappear during a course of medical treatment and there is later a return of the symptoms, the fault is due to dietetic carelessness.

(4) Surgical treatment is to be preferred for the cases complicated by pyloric stenosis not yielding readily to medical measures, cases showing repeated hemorrhage, penetrating or perforating ulcers, and for cases

in which a prolonged medical course is impossible.

(5) Simple gastroenterostomy fails to provide permanent relief in a number of cases, and should be supplemented by resection of the ulcer, cauterization, in folding or partial gastrectomy.

BASTEDO, W. A.: The Treatment of Mucous Colitis. *Journal American Medical Association,* Jan. 24, 1920, lxxiv, No. 4, p. 240.

The author begins the consideration with two propositions: *viz,* (1) "Retained mucus is harmful mucus"; and (2) "The cure requires at least a year of careful treatment."

Treatment proper is divided into the following:

I. TREATMENT IN CASES WITHOUT COLIC, OR AFTER ATTACKS OF COLIC.—(*a*) *Prevention of Accumulation.*—To prevent accumulation of mucus the writer begins with a weekly purge of castor oil, supplemented by perhaps daily colonic irrigations of hot tap water, first the left-sided posture with a gallon followed by use of from 3 to 5 gallons in the right-sided posture, followed by cathartic pill at bed-time if mucus is slow in coming away. Height of bag not over two feet above patient.

(*b*) *Overcoming of Constipation and Intestinal Toxication.*--The constipation should be controlled with mild tonic laxatives; *viz,* cascara, rhubarb, etc., and after acute conditions are over, with laxative dietary as fruits, bran, and coarse vegetables, etc. Exercise, except to strengthen abdominal muscles is of no value in constipation, but in ptosis, with the assistance of an inelastic binder for mechanical support, the exercise should be directed toward strengthening the abdominal wall. (These ptoses are very common). Free water drinking is recommended. If such methods do not overcome stasis and toxemia, surgery should be considered.

(*c*) *Improve Nervous and General Health.* —Modify diet to meet the working power of the stomach and upper bowel. Usually bland lacto-farinaceous type of diet suits best, avoiding meats, eggs, dried beans, peas; but underfeeding should be avoided. Patients must not coddle themselves, neither should they get unduly fatigued either physically, mentally or emotionally. Alcohol, tobacco, and coffee should be cut out. For severe nervous conditions, bromids in 15 to 30 grain dosage once or twice daily are needed.

In severe cases the patient must be put to bed in charge of a competent nurse.

II. TREATMENT OF ATTACKS OF COLIC.—(1) Rest in bed; large doses of bromid; ½ to 1 dram (1.90 to 3.75 c. c.) by mouth. Hypodermic of atropin sulphate grain 1/65 (.001 gram), with codein phosphate, grain ½ (.0324 gram). Hot applications to abdomen in the form of electric pad, stupes or both. Morphin should not be ordinarily employed. Atropin is the best single drug to relieve the pain but is of no use for the cure of the colitis.

(2) Clear out the mucus, as above with colonic irrigations. If impossible to retain enemas place patient in knee-chest position and inject slowly from ½ to 1 pint of warm cotten-seed oil to be retained over night or as long as possible.

Treatment of hemorrhoids as a complication is with nightly instillations of 60 c. c. of warm olive oil, using a soft rubber ear syringe.

EINHORN, M.: The Diagnosis and Treatment of Gall-bladder Affections. *New York Medical Journal,* July 3, 1920, pp. 1-5.

In acute cholecystitis there are present fullness and distress in the right hypochondrium; anorexia and sometimes slight icterus; no fever or a moderate rise in temperature for a few days.

In recurrent or chronic cholecystitis there exists a repetition of the same symptoms with increased severity and duration, or typical attacks of severe colicky pains of

comparatively short duration occur usually in the right hypochondrium, radiating to the back and upward.

The treatment of gall-bladder diseases can be divided into that of the acute conditions, and that covering chronic states. In both groups medical as well as surgical therapy have their special fields.

In acute cholecystitis, with or without stones, treatment consists of absolute rest, hot applications and the administration of an opiate. A hypodermic injection of morphin with or without atropin, a suppository of opium and belladonna, or the latter with codein, will be beneficial. Hot drinks of plain water, or camomile tea are useful. Irrigation of the bowel with warm saline and the addition of essence of peppermint (one teaspoonful to a quart), especially when there has been no defecation for a day or two—is likewise beneficial. Usually the acute attack subsides in from one to three days, and there is either a return to the normal or, more frequently, to a kind of quiescent or latent stage.

Acute cholecystitis of great toxicity requires immediate surgical intervention.

The treatment of recurring cholecystitis, with or without stones, during the latent stage, has two objects: (1) to reduce stagnation of the bile; and (2) to combat the infection. The former is accomplished by drinking large quantities of water. The infection is best combated by urotropin, salicylic acid, salol, aspirin, and by flushing the gastro-intestinal tract with great quantities of water. Einhorn found that glycerin given in teaspoonful doses, three time daily, exerts an antiputrefactive action on the bile. The following prescription has been given with advantage:

Natrium bicarbonate℥ ii
Glycerin pure℥ ii
Aqua destillata℥ v.
Sig. ℥ s. s., t. i. d., one half hour a. c.

Antiseptic and astringent solutions can likewise be instilled directly into the duodenum. Ichthyol (one-half to one per cent) or argyrol in the same strength (blood temperature) can be thrown into the beginning of the duodenum in amounts of from 10 to 20 c. c. daily or every other day while the patient is in a fasting condition.

Gall-bladder affections in which there is sufficient reason to suspect a malignant disease should be operated upon as soon as possible.

Contra-indications to operative measures are found in severe heart or kidney lesions, diabetes mellitus, general debility and old age. What to do under these circumstances will depend upon the severity of the gall-bladder affection and the degree of involvement of the other organs. A careful consideration of the danger of the operation and the benefit to be obtained by it, will make a decision possible.

Riessman: Gastro-intestinal Disturbances and Eclampsia (Magen-Darmstorungen und Eklampsia). *Frauenartz,* 32 Jahrg., Hft. 9; abstracted in *Zentralblatt für Gynakologie,* May 15, 1920, 527.

Riessman suggests that eclampsia is the result of alimentary intoxication with its subsequent pathological changes in organs, (kidney, liver). He considers that the absorption of alimentary toxins may be prevented by anti-constipation measures.

Einhorn, M., and Meyer, W.: Diagnosis and Treatment of Recurring Cholecystitis Without Stones. *Medical Record,* Aug., 7, 1920, pp. 211-216.

Eighteen cases of recurrent cholecystitis without stones were operated upon, and in this way the diagnosis was corroborated per autopsiam in vivo.

The authors state that mild cases of cholecystitis yield often to medical treatment. This consists in ample rest, frequent small meals, plenty of water, saline aperients (Carlsbad, Saratoga, French Lick Springs), washing of the duodenum with a weak argyrol or ichthyol solution (1 to 2 per cent.)

The diagnosis of cholecystitis is based upon the symptoms (colicky pains in the upper abdomen; distress in the epigastrium radiating backward to the right) in conjunction with the presence of pronounced turbid bile in the duodenum in the fasting condition of the patient, as found by means of the duodenal tube. The existence of a considerable leukocytosis, with an increase of the polynuclear elements, enhances the diagnosis and indicates very clearly the severity of the lesion.

GLANDS OF INTERNAL SECRETION

Stanley, L. L., and Keller, G. D.: Testicle Transplantation. *Journal of the American Medical Association,* May 29, 1920, pp. 1501-1503.

The authors made their first implant in August, 1918. Altogether, operations were performed in 11 cases with human material and 5 with testicles removed from young rams. The time elapsing since the use of the animal tissue has been too short to make any deduction as to its value.

However, the results of the sheep testes transplantation, so far, have not been encouraging, although one man, aged sixty-five, seems to have been benefited.

Rohdenburg, G. L.: Thyroid Diabetes. *Endocrinology,* Jan. to March, 1920, iv, No. 1, p. 63.

Two sisters developed glycosuria at the menopause. A son of one of them at the age of puberty developed diabetes and was treated as such for seven years. During this period, taking of either thyroid or adrenal gland substance caused a striking rise in his glycosuria, which subsided when the gland was withdrawn. Later he developed a state of hyperthyroidism, and lobectomy was done. Folowing this operation his glycosuria disappeared, and he is able to take very large quantities of sugar without a return of glycosuria. A second patient had a portion of thyroid gland removed on account of hyperthyroidism, and a few years later developed glycosuria. After a later resection in which all of the thyroid except the isthmus was removed, the glycosuria disappeared after four days, and she was also able to take large amounts of sugar without glycosuria. These cases indicate a definite relation of glycosuria and thyroid activity, and it is pointed out that an increased glycosuria after thyroid administration, suggests that thyroid may play a part as an etiological factor in diabetes.

Greenberg, D.: Metastatic Abscesses of the Thyroid Associated with Hyperthyroidism. Report of a Case Following Repeated Attacks of Sore Throat. *Journal of the American Medical Association,* 1920, lxxiv, 165-166.

This is a report of a case of hyperthyroidism following repeated attacks of acute peritonsillar and pharyngeal infection.

The writer emphasizes these points: (1) Thyrotoxic symptoms may appear in cases of simple goiter, the result of an acute infection.

(2) Bacteria may be a factor in the causation of exophthalmic goiter; if not directly so, at least effecting such changes in the physiology of the gland as to make its appearance likely.

(3) Suppuration of a thyroid gland should be suspected when there is even slight pain and tenderness over the gland with enlargement, especially with a history of preceding infection.

KUNTZ, A.: The Innervation of the Gonads in the Dog. *Anatomical Record,* 1919, 20, xvii, 202-219.

Careful dissections were made in a number of dogs to determine the anatomical relationships of the nerves which supply the sex glands. In order to determine more accurately the sources of the sympathetic fibers to the testis and to observe the results of resection of these fibers, operations in which the inferior mesenteric ganglia were removed and the nerves descending along the right spermatic artery were resected as completely as possible without injury to the walls of the vessels were performed aseptically on dogs. These animals were killed after intervals of from 21 to 30 days. The spermatic cords and testes were removed. Parts of the tissue were prepared by the pyridin-silver method and parts by ordinary staining processes. For the study of the distribution of the sympathetic fibers in the gonads, both ovaries and testes of unoperated dogs were prepared by the pyridin-silver method.

Kuntz summarizes the results of his observations as follows: The sympathetic nerves to the sex glands pass distally along the ovarian and spermatic arteries, respectively, and enter the glands in more or less intimate association with the blood-vessels or the efferent ducts. The majority of these fibers are derived directly from the sympathetic ramus ascending from the inferior mesenteric ganglia to the renal plexus.

The blood-vessels and all other structures in the sex glands which contain smooth muscle receive an abundant sympathetic nerve supply. The evidence available does not indicate a sympathetic nerve supply either to the ovarian follicles and the interstitial secretory tissue in the ovary or to the seminal epithelium and the interstitial secretory tissue in the testis.

Resection of the sympathetic nerves to the testis is followed by degeneration of the seminal epithelium and hypertrophy of the interstitial secretory tissue. The degenerative changes are probably due to paralysis of the blood-vessels in the spermatic cord and testis. Hypertrophy of the interstitial secretory tissue is an accompaniment of degeneration of the seminal epithelium.

BALEN, M. J.: Addison's Disease. *Journal of the American Medical Association,* Jan. 10, 1920, lxxiv, 82.

The author reports the case of a man aged forty-eight, who was admitted to the hospital complaining of "liver trouble", and extreme and progressive weakness. He had had mumps and whooping cough in childhood; his past medical history was otherwise unimportant. He had been in fairly good health until about six months before, when he began to experience constant muscular fatigue, independent of exertion, and to be subject to spells of faintness, dull headaches and pain in his shoulders. His appetite of late had been poor, his bowels constipated.

For the past six months he had been growing progressively weaker and on admission his weakness was extreme. Coincidently with the beginning of his weakness, his skin became brownish. The pigmentation was gradual in appearance and steadily progressed in intensity. No history of venereal infection or of any accidents or operations. Twenty-four hours after admission the patient became pulseless, went into coma and died suddenly.

The history of a condition with an obscure and insidious onset, with profound and progressive asthenia, general debility, feeble heart action and circulation, low blood-pressure, nervous and mental depression, digestive disturbance and a brownish pigmentation of the skin calls to mind the characteristic syndrome of Addison's disease. The findings at necropsy, namely, tuberculosis of the lungs and of the suprarenals, together

with enlargement of the spleen, completes the clinical picture of this rare disease.

The very low blood-pressure was probably due to an alteration insufficiency or total suppression of the internal secretion of the suprarenal bodies in consequence of their destruction by tuberculosis. The sudden death precluded any attempts at suprarenal treatment. It is doubtful if such therapy could materially influence the course of the disease in a person whose system had been irreparably damaged by grave and extensive lesion of tuberculosis. The strange feature in this case was the absence of a history and symptoms of pulmonary tuberculosis.

Hoskins, E. R., and Hoskins, M. M.: The Interrelation of the Thyroid and Hypophysis in the Growth and Development of Frog Larvæ. *Endocrinology,* Jan.-Mar., 1920, p. 1.

A preparation of the anterior lobe of beef hypophysis, which contains some form of iodin, 1:200,000, when fed to normal frog larvæ brings about precocious metamorphosis, the size of the frog varying with the size of the larva at time feeding began. These frogs have little vitality, and appear to have a high water content. The substance is more toxic to small larvæ. When preparation was fed to thyroidless larvæ, which would have remained in the larval stage for a long time, metamorphosis began within 24 hours and became nearly complete when the animal died or was killed. The effect is both progressive, as seen in the skeletal and cutaneous development, and retrogressive as seen in the changes in the digestive tract and tail, and the results are regarded as being due to the stimulation of natural general metabolic processes. It is very doubtful that the action is due merely to the iodin content of the substance, yet feeding to larvæ with both the thyroid and hypophysis removed, will bring about metamorphosis. The thyroid and hypophysis are closely related physiologically, and can to some extent function vicariously. It is quite possible that the initial stimulation in hypophysis feeding is due to effect upon the calcium and phosphorus metabolism, as is indicated by the skeletal changes noted in these experiments.

BACTERIOLOGY AND PATHOLOGY

Loewenthal, W.: Bacteriological Findings in Encephalitis Lethargica. *Deutsche medizinische Wochenschrift,* March 11, 1920, No. 11, J. 46, p. 289.

Loewenthal had an opportunity to examine bacteriologically a case of this disease in the Hygienic Institute in Berne, after having received from the autopsy some blood, different parts of brain tissue, spinal cord, spleen, liver and kidneys. He inoculated with the brain and cord three rabbits intracerebrally; with brain and spleen three mice subcutaneously, and with the various organs fourteen guinea pigs intraperitoneally. One of the rabbits died from a cold two days after inoculation. The mice died after four days; microscopical examination of stained and unstained as well as dark field illumination preparation, showed nothing remarkable; the cultures remained sterile; the inoculated guinea pigs all remained alive.

Cultural examinations of the autopsy material showed only a few banal contamina- thal agar, however, showed the presence of Gram-negative non-motile bacteria whose tions. Cultures of spleen tisue, on Levinshape and size was similar to that of Pfeiffer's influenza bacillus. These bacteria grew only on the Levinthal agar medium; they

could not be cultured on ordinary agar or on Loeffler's serum.

The colonies were perhaps less translucent than those of the usual influenza bacilli; but the difference was so slight that it could hardly be used as a differential criterion.

Pure cultures of the bacillus inoculated subcutaneously into mice and guinea pigs had no deleterious effect on these animals.

(The abstractor regrets that Dr. Loewenthal does not make any reference in his article to the bacteriological researches on encephalitis lethargica made in this country, especially the work of Loewe and Strauss).

Chiuscik, O.: Familial Cirrhosis of Liver in Children. *Archiv für Kinderheilkunde,* 1920, lxviii, 144; abstracted in *Journal American Medical Asociation,* 1920, lxxv, 1527.

The necropsy of an infant girl of 15 months showed hyperthrophic cirrhosis of the liver. Two other children, also girls, had died in infancy with symptoms of acquired jaundice. No alcohol had ever been given the children. The family was otherwise healthy, one, a boy, never having shown signs of jaundice.

Marie, P., and Leri, A.: Vertebral Lesions and Spasmodic Torticollis (Lesions Vertebrales et Torticollis Spasmodiques on "Mentaux"). *Bulletins et mémoires de la Société médicale des hôpitaux de Paris,* March 18, 1920, 359-372.

These authors give the details of seven cases of so-called spasmodic or mental torticollis. In each case stereoscopic roentgenograms showed irregular outlines of the vertebrae in the neck, excrescences and hooks like those seen in chronic rheumatism of the spine. The mental condition of these patients was quite normal.

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